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Soul of things

William Denton, Elizabeth M. F. Denton

Spirit
1863

129

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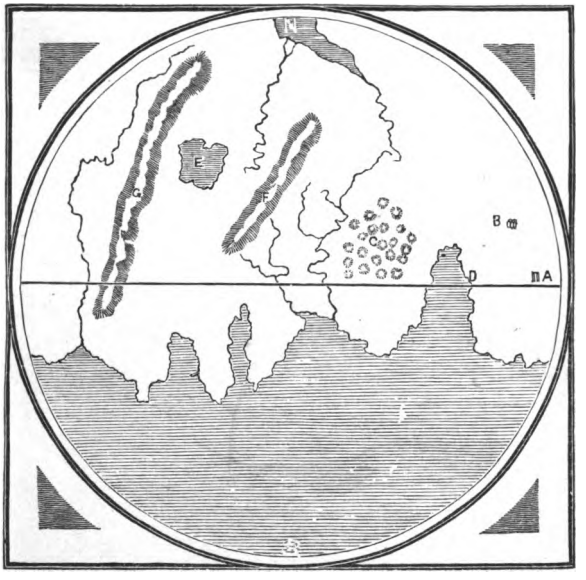
MAP OF JUPITER. — See pp. 267–298.



A. — Astronomical convention.
B. — Houses and city, seen March 19, 1870.
C. — Sugar-loaf hills, seen March 23, 1870.
D. — People seen recreating March 5, 1870.
E. — Lake seen March 23, 1870.
F. and G. — Chasms of mountains, seen March 23, 1870.
N. — Polar sea.

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SOUL OF THINGS;

OR,

PSYCHOMETRIC RESEARCHES AND DISCOVERIES.

BY WILLIAM DENTON.

VOL. III.

BOSTON:
PUBLISHED BY WILLIAM DENTON.
1874.

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THE SOUL OF THINGS.

CHAPTER I.

GEOLOGICAL EXAMINATIONS.

GEOLOGICAL investigations can hardly be said to have begun before a hundred and fifty years ago; yet what multitudes of organic beings have been called up from their rocky sepulchres, and made to tell their portion of the story of the earth! The grand order of the development of our planet, from its fiery chaos to its man-crowned beauty, has been revealed; and every day adds to the perfection of the revelation. But all that the geologist has had to draw his lessons from have been fragments, and sometimes very small fragments; and in no case has he been able to observe a single perfect animal or plant of all the host that he has described. The resurrection-trumpet has been sounded; but only the old skeletons have come up, or fragments of skeletons, — a bone, a tooth, a claw, or a scale; and from these he has had to guess, too frequently, what others have supposed he knew; and the guess of yesterday, and the fabric reared upon it, may at any time be thrown down by the fact of to-

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morrow. We need only to look at the various restorations of extinct animals contained in our geological works, and mark their great differences, to see how difficult it is to clothe an animal with flesh, even when the whole skeleton has been obtained: how much more difficult when we have only a fragment of the skeleton!

But, however deficient the geologic record may be, the psychometric record is absolutely perfect. From a fragment of a mastodon less than a pin's head in size, the original animal may be seen with perfect form and color and surroundings; and the psychometer, if an artist, may draw it as perfectly as the living animals around him. The hosts that have died, and "left no sign" in the rock that the geologist can observe, the psychometer finds alive and active; and he can at will pass along the grand life-processions, and mark every progressive step, from the gelatinous dot in the primal ocean to the Greek philosopher in his study.

Geological books are to be written in which all the animals and plants figured will be perfect in form and color, and their true position in the scale of life be accurately assigned; picture-galleries are to be made in which they will be represented, and a walk through them will teach a person more of paleontology than a year's hard study at the present time.

What is seen by one psychometer will be checked by the independent sight of others, and the new discoveries that geologists are constantly making, as well as by the symmetry and harmony that exist among all living beings; and all the facts of the past of our

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planet that we may consider worth appropriating will become the property of the present and the future.

MASSACHUSETTS IN THE LONG-AGO.

To the geologist who is not afraid of a fact because it is new or strange, there can be few subjects of greater interest than the pictures of the primitive history of our planet which psychometers have drawn. In the fall of 1866, while waiting at Worcester Station for the train, I asked Sherman, then ten years of age, to see what that part of Massachusetts was like long ago.

"I see tents, with Indians in them. There was a small stream coming down that way" (pointing toward the town: there is one now; but he could not see it for the houses) "at that time. The Indians talk away; but I cannot tell what they say. They use bows and arrows. They have feathers in their hair. There are many hawks around. It is a hot day.

"One Indian is pointing his arrow at a hawk. Yes; several of them now. Two have missed, and one hit and killed it. The one that hit it is running with it. He has put it on the fire. There are some little coals, and he is blowing them. He has got it into a blaze now: it is inside a tent. It is not a hawk, I see. It has a straight and very short bill. The bird is as large as a full-grown chicken. It is done now; and all those in the tent are sitting down, and eating it. They tear it with their fingers. Another one is killed now. They look very small up in the air. The arrow stuck into him, and they have

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got it out. They are doing the other the same way. They take out some of the feathers, and stick them in their hair. They are quite pretty."

("Go back a little, and see earlier men.") "Oh! I went too far. The land is heaving up like the waves of the ocean, but away up as high as a mountain, and then down, away down, in five or six minutes, — miles down, and then miles up again. I see great cracks, larger than a river, away down to the lava; and in half a second the lava comes rushing up. The rocks were solid then; and they bend and snap and crack — oh, awful! A person could not see half a mile off, the land rose up so; then it sank down, and he could see miles away (1). The smoke comes up out of those cracks in great rolls, with a noise louder than thunder. I see no living thing. Nothing could live; nothing could breathe. The air is full of gas; all poison. It comes up with the smoke. This lasted for some weeks; then it was all quiet; but after that it belched out again. The smoke came out till it darkened all the sky. The sun could not shine through it. It clears off in spots sometimes, and the sun shines there, but nowhere else.

"The lava poured out of those cracks has bubbles on it; and, when it cools, there are holes, from the size of a pin's head to the size of the top of a bushel-basket. I see big bubbles that I could walk on: they sink; and the gas and steam run under, and come up in bubbles somewhere else. When it cools, they break, and that leaves the rock full of holes. I see a bubble now, nearly as large as this station-house.

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There is a crack under it full of smoke. This does not break: it is thick; but, long after, it fills up, and is like the rest of the earth.

"Sometimes it scares me when I get into these places: it seems as if I could never get back again."

(1.) When the crust of the earth was first formed, and while it was still, to some extent, plastic, such phenomena as he describes must have taken place frequently; since, thick as the crust now is, it is heaved and rent by the imprisoned force which was probably much greater when the earth was in a more highly heated condition.

The original fiery fluid condition of our planet is seen by all psychometers that I have tried. Geological facts innumerable have established it beyond all reasonable doubt.

AN EPITOME OF THE WORLD'S GEOLOGICAL HISTORY.

In November of 1867 he tried a slab of limestone from Waynesville, O., and said, —

"I can see men with it, if I wish." I said, "Go back as far as you can."

"Oh! I see the world all lava, and it is all waves. There are little pieces of crust floating on top, that have cooled. I see different colors of metals, — one green, and another that looks like water. It looks like molasses boiling. It rises up like a large blister, and then puffs out, when it bursts, and sends up some into the air.

"One of those bubbles rose up like a tall moun-

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tain, — the tallest I ever saw: it burst at the top; and clouds of what looked like steam rose out of it, and then it sank down.

"The lava is quite hard now, and streams of soft lava pour over it.

"Now I see ponds of water run on top of the lava, like drops of water on a hot stove. They keep running, and growing smaller and smaller, till they go to nothing. The water runs in large lakes. It stays a long time in some places; but all evaporates at last. Water comes up in these bubbles, and pours over. There is some kind of stuff that floats on top of the water, like oil. It is a kind of metal, I guess. It runs down like water on quicksilver (1).

"The sky is all red. The sun looks a great deal bigger than it does now: it looks three times as large (2).

"It is about all I can do to breathe. If I were there in the body, I could not breathe at all. It seems as if it would stop up my nose and mouth. I feel as I should if somebody put a pillow on my face, and sat on it." ("Go farther back.") "The world is hardly rough at all now, and no gases, no water, no bubbles, nor any thing. It is all calm. It is a great sea of lava, as calm as the ocean ever was. No crust, nor any thing. There is no day nor night to the world. I cannot see the sun, the lava is so bright. It is just as bright as the sun. It would roast a potato twenty miles off." ("Can you go back farther than that?")

"I went back, perhaps, a million years; but it looks just the same. By putting it up to my hair, I can

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see the present." ("Come gradually to the present.") It seems as if the earth was slipping under my feet, and the sky rolling over my head. I can go back and forward in time by pushing the specimen up and down. I can see the men of the present; then early men; then bears and elephants, and such things; then snakes, crocodiles, and other reptiles; then birds; then animals like the trilobites and such things, and shells; then little bits of insects; and then nothing at all but lava. The animals get less and less, till there is nothing." ("Come gradually forward.")

"Now those little bits of insects that pat the dirt (3), now trilobites, now insects, now very low shrubs, now trees, now reptiles and birds and snakes and such things, now the very early men, and then as it is now."

(1.) This may have been potassium, unable to burn in consequence of the lack of oxygen in the enveloping atmosphere.

(2.) One can hardly suppose the sun to have been visible from the earth at that time; but the water of the globe may have been steam, which, before it condenses into vapor, is as transparent as air. The great apparent size of the sun may have been due to the medium through which it was seen, the atmosphere at that time being very much larger than it is now; though, if the sun is a cooling globe, it must have been somewhat larger then.

(3.) These, which are referred to in another examination, appear to have been small crustaceans, and one of the earliest animals that lived occasionally on the land.

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THE WORLD BEFORE LIFE.

In April, 1868, trying a specimen of quartz from Switzerland, he said, —

"I see the earth all lava, and the vapors rising. The air is very strong, poisonous. The vapors curl up like smoke of different colors. There is a green vapor that is very choking: it rises from light green metal, that floats in currents on top of the lava. The lava is almost white-hot, and currents of green and blue flow among it. Mountains of lava sweep along like waves in the ocean.

"Now I see a little bit of a black crust on top."

(Moving the specimen up his forehead, he said, "Every move I make is about a million years ahead.) You could break it through with your foot. Now it is thicker. The volcanoes come up as bubbles on the water, near falls, and cover the earth as small-pox does a man's body. I see hills rise and sink every few minutes. They rise (lava pours out), and then sink as level as before.

"Plenty of smoke now, and showers of red-hot stones.

"Now the crust is thicker, and not so many volcanoes. The world looks curious, — great bubbles, with thin crusts that would just bear you. They are black, with some white streaks in them. I broke through some (it seems as if I had my weight). The earth is terribly hot yet, and the sun is hot too.

"The earth is black now everywhere, all rock. Part of it is broken up, and marked with rings where the volcanoes have been.

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"I see some water now, — an ocean: there is a volcano in it. The water is hot: it boils like a pot on the fire, and steam is everywhere. I see a mud volcano. It throws up great *splathers* of mud into the air: it is real hot. It is two or three miles across the crater. Once in a while I hear an awful thundering, and then the mud is sent out in great masses. There is such a racket all over the earth, you cannot hear yourself speak.

"The earth is cracking now; and earthquakes shake every thing. I see down to the lava: it comes bubbling up once in a while. I threw a stick down on the lava; but it did not blaze up for a good while." ("Where did you get the stick?") "I imagined I had one; that was all. The clouds form into many shapes of things.

"I see a volcano now, pouring out nothing but clear hot water like a river. It makes hardly any noise. It takes it as easy as can be. It runs into a kind of basin, and forms a pond. The ground is so hot, that a man could not stand on it ten minutes without being scorched to a blister.

"Those patting animals are the first things I see on the land; and I see nothing earlier in the water. They lived in the water too."

These descriptions are suggestive, to say the least. Whence come such vivid pictures as these? That the boy saw them is beyond all question; for, although I have never seen any thing similar, the persons who have, when trying specimens for me, number more than a dozen, some of whom knew nothing about the matter till they came up before them. Whence

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such a scene as the hot water rolling in lakes over the heated surface of the earth till it was evaporated; the rocks so soft, that they rose in bubbles; and, the steam enclosed blowing off, they sank again; the mud geyser, and the volcano pouring out water like a river? All these seem natural enough when we hear them; but what suggested them to the mind of the boy, or, rather, presented them to his internal eye?

A few weeks ago, Sherman made another examination of an early period of the world's history.

"I see the earth red-hot. There are black spots on it, as there are on the sun. It is very still. There is a great deal of black smoke rising from cracks in these black spots." ("How large are they?") "Miles in extent.

"It looks as if all the moisture was in the air. The water comes down at times in streams, sheets, and then flows about like water on a hot stove (1). The surface of these places is quite black and smooth. There are slight elevations and depressions; but they are rounded and smooth. The water does not evaporate as fast as it would if it were not as hot. I hear reports like a cannon going off. I do not know what causes them.

"There is a great deal of electricity. Every second or two the lightning flashes, and I hear the reports, — no long, rumbling sound, but as if they were very near. The report follows the flash at once (2). When I look up, it is dark, there is such a cloud; and, when I look down, it is light. All over the black spots are holes; and out of each of them is a steady blaze, almost white, three or four feet high, coming up all the time.

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"The bright part of the earth looks white, and as if one could see into it. The surface is as smooth as glass. The rain falls on that, and turns it black as soon as it falls; but it soon gets as hot as ever. There is some noise and agitation underneath, where it is black.

"I see on one of those black spots a little sea, that remains there. It is not even boiling; but steam rises from it all the time."

("Is the water clear?") "Yes; quite clear." ("Taste it.") "It is fresh water, but warm. It seems like good water.

"I see another small lake near there; and it looks as if petroleum was on it, and burning. I see nothing but a bluish-yellow flame, that looks like the flame of alcohol and salt (3).

"I can see a great deal of mica in these islands. One mass is two feet thick, ten feet wide, and fifty feet long. It has been lifted up, so as to show its edge."

(1.) The mass of water contained in the ocean is estimated at $\frac{1}{1800}$ of that of the earth. It has also been estimated, that if the surface of the earth were level, and the water of the globe equally distributed over it, it would have a depth of no less than two miles. If we add to the water of the ocean what is now a component part of rocks, and that which is contained in rivers and underground-crevices, we have an immense body to be held over the earth in vapor, and that would drop as soon as conditions would allow, which would be while portions of the globe were still intensely heated.

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(2.) The evaporation of water produces electricity; and, when evaporation was proceeding as rapidly as at this period, electricity must have been generated very abundantly.

(3.) The yellow color was probably due to sodium.

THE DAWN OF LIFE.

For long ages the planet must have been a grand chemical laboratory, minerals forming, dissolving, and re-forming, as changing conditions necessitated. For ages more it must have been a rocky desert, on whose heated bed fire and water struggled for the mastery. Life at length appears, probably in forms too small for the eye to see; and the first the psychometer observes are merely what are conspicuous enough to arrest his attention.

The specimen examined was a small fragment of a supposed fossil (*Eozoon Canadensis*) from the Laurentian rocks of Canada.

Nov. 5, 1867.

"I am near the ocean; and there is a volcano in the water, a long way off, throwing up rock. I can see the water steam when the lava comes down; I can see those things that pat down the dirt (1). The climate is very hot. I see no other insects than those that pat the dirt. There are hot springs on a little hill boiling up.

"Every time the volcano bursts out, the air almost knocks me down. It is like a thousand cannons going off at once. There is very little to see, — no trees, nor any thing. As I go along the shore, I can

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see seaweed: it is red and short, about half as long as my little finger. In some places the rock is reddish. Once in a while I can hear a stone drop right near me from the volcano. The land is nearly all rock, and the rock is nearly all full of little holes (2). In some places there is rich soil, and a kind of plant growing in it that has little branches like pine-needles. It is about an inch high" (3).

(1.) Referred to previously.

(2.) The rock, from his description, appears to have been lava.

(3.) If this is really a description of the earth at the time when the Laurentian rocks were formed, there are many blank pages in the earth's geological history, or at least many pages that we have as yet had no means of reading. The oldest land-plants at present believed to have existed are found in the primordial rocks of Sweden; but the Laurentian rocks are probably much older than those; and even there we cannot be at the beginning, even, of land-vegetation, though probably near to it. Yet, previous to that, life must have existed in the water for a long period.

LIFE IN CAMBRIAN TIMES.

The Cambrian rocks, so called because well developed in Wales, ancient Cambria, represent to the geologist the next step in the world's history.

Small fragment of *Oldhamia radiata*, from Ormes Head, Ireland. Specimen unseen, and nothing known by the psychometer regarding it. Examined by Mrs. Denton.

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"I see what looks like a point of low land stretching into the water. I seem to be beside an immense mountain-range. It seems as if the land had dropped down, and left a precipice of enormous height (1). There seems to be nothing here but water and rocks, — naked rocks, holding water in large basins. I see no sediment nor soil anywhere. I see no algæ in the water, and no lichens on the rocks. All is bare and desolate, as if worn by water. This seems to be near a large body of water which I sense behind me."

("Is there life anywhere?") "I see none here. This rocky tract is very extensive. It seems somewhat narrow in front, but extends right and left of me a long way. Massive rocks lie around, that seem to have been broken by some convulsion. They are angular; and water is all in among them. The water is not as salt as the ocean; but it is not fresh. To the north-east that high range sweeps down low, and there seems to be a river flowing in.

"There is something growing here that clings tightly to the rock, as if it had nothing else to live on: I think it is where the water washes over the rocks. (That river widens out greatly at its mouth.) I see some shells here in shallow water that are curved like snails. There are two or three kinds here, — three kinds. One is flattish, and a little oval. It has a whorl just at the small end. The first kind has little points all over it, making it rough, though the shell is thin: all of them, indeed, seem thin and fragile (2). The largest that I see are about a quarter of an inch broad, and a little longer.

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I see another gasteropod, with ridges across. Now I see a bivalve: it is also small, but ridgy. I am at the margin of the sea, — at the mouth of that river.

"Now I see a shell that has an inside shelf. It is a bivalve; but the shelf is softer than the outside shell, though stiffish. One kind has clusters of marks, or ridges, upon it, in two ways, from near the edge of the shell, three of them on each valve, but the middle one larger than the others.

"I cannot tell whether the animal that I see now belongs in the water, or out of it. There are four or five rings, or belts, to it. It does not seem very hard. It must be an articulate. The rings seem like threads drawn round it to make it tighter in one place than another. I see a number of them. They are small. I see another animal, somewhat harder, that has a kind of brush at both ends."

(1.) Many such mountain-ranges and precipices have been worn down since that time.

(2.) This is probably the reason why so few have been preserved as fossils.

Here are seen by the psychometer seaweeds, articulates, and mollusks, in the form of gasteropods, and probably brachiopods, but small, and with fragile shells. The Cambrian rocks have yielded to the geologist seaweeds, articulates, and brachiopods, all small.

EARLY LIFE-FORMS.

Calciferous sandstone from Ogdensburg, N.Y., examined by Sherman in 1866.

"I see a little insect crawling along in the dirt,

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that looks something like an ant. That is all I can see.

"I see another, a larger animal, that slaps the dirt with its tail. I have to look close to see them. This one is about an inch long. I see one of them now about two inches long. They have six legs. The sun is shining bright. It is very hot, — hotter than I ever felt it before.

"I see hundreds of those animals that pat down the sand. They bite. One almost took the skin off. (It grows dimmer as I take it from my forehead; but I can see them three inches off.) What millions I see now! There is about an acre all patted down by them (1).

"I see a curious animal, crawling like a clam; but it has no shell: it is leathery. It makes a track (2).

"I see a volcano in the water, and lots of hilly islands. One has sunk down. There is a little lake in the middle, and a round island like a ring. The lava flows into the water; and the steam rushes up in clouds. I can barely see the fire. There is quite a high mountain in the water. It makes an awful noise, — worse than any thunder. The lava runs in, and drains the water up for quite a distance. As it rushes in, it turns into steam all around, and leaves it dry. Great red-hot rocks come down with a terrible splash. Where they fall into the water, the steam comes up in great white bubbles for a long time. I can see the reflection of the lava, and the red stones, in the water. (When I turn the specimen, it seems another place altogether.) A rock fell just then as big as this house. It was thrown up almost out of sight" (3).

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(1.) The calciferous sandstone is in the Lower-Silurian formation, next to the lowest fossiliferous group of the United States. It was laid down at a time when life was almost entirely confined to the sea. Tracks, probably made by large crustaceans, have been found in the Potsdam sandstone below it, proving that living beings traversed the sandy shores as early even as that. The first animal seen by Sherman is the same previously referred to, which seems to have been very abundant at an early period.

(2.) The animal crawling like a clam was probably a tunicated mollusk, having no hard shell. The tunicata could leave no impression, save a track, recognizable by the geologist.

(3.) At this early period it is probable that volcanoes were numerous and very active, and most of them in the immediate vicinity of the ocean.

LIFE AT THE BOTTOM OF THE SILURIAN OCEAN.

The specimen was a slab of limestone from Richmond, Ind., examined by Sherman, May, 1873. The age of the specimen is probably about that of the summit of the Trenton limestone, of the Silurian formation.

"I see a fish about two feet long. It seems very soft-bodied, and has an enormous mouth. The tail seems clumsy. There is not a scale on it, and it has no teeth.

"At the bottom there are animals like lilies: they must be crinoids. This fish comes along, and snaps the flower-like head off. When the crinoid is tough, it takes hold, backs, and pulls it up. The inside

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of the throat is lined with short, sharp spines, that seem to answer the purpose of teeth (1). (Draws Fig. 1.)

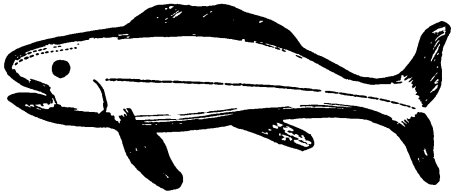

FIG. 1. — Crinoid-eater.

"I see almost a field of those crinoids, in bunches, five or six together, like a lot of lilies from a stem (2). I can see the parts that surround the head in motion, in and out, as if they were gills to fishes. Some have a reddish color, and others are dark brown: those seem to be the old ones.

"Now I see a very strange animal. I do not know what to call it: it seems to be part lizard, and part fish. (Draws Fig. 2.) The upper jaw projects.

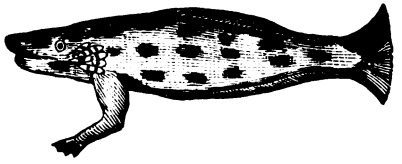

FIG. 2. — Fish-reptile.

It has no hind-feet. It moves its tail a while, and then its feet. The skin is smooth and spotted (3).

"There is an animal at the bottom, dead. It seems to be some kind of crustacean, or a fish crusted all over. I have seen pictures of animals something

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like it. It is about three feet long (4). (Draws Fig. 3.)

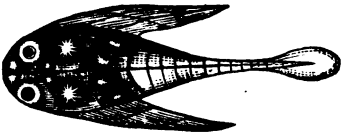

FIG. 3. — Star-plated fish.

"Now I see some small animals that look like water-bugs, such as make dragon-flies. They are very small and translucent.

"I made the fins wrong to that crustaceous fish" (alters them): "they are pointed.

"Now I see a strange animal. It is flexible in the middle, and moves by bending its body. It looks more like a leech than any thing else. It is soft-bodied, and about four inches long. It is very sensitive: when it touches any thing, it stops instantly, and then moves cautiously. It does not seem to see, but goes by feeling. (Draws Fig. 4.)

FIG. 4. — Leech-like animal.

"I was looking at the head of one of those crinoids. One of those water-bugs came along, and it

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was sucked right in; and the parts round" (arms) "closed upon it at once. Now they are opening very slowly (5).

"I see a worm now with a fringe all round the edge of it, so that it looks broad. (Draws Fig. 5.)

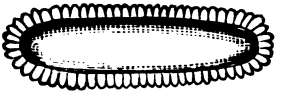

FIG. 5. — Fringed worm.

It seems like a leech. It has two small pincers, like a beetle, by which it catches small animals."

("Are there any plants?") "I see what look like plants, floating about, and yet growing. They are spread out like Irish moss. (Draws Fig. 6) I

FIG. 6. — Floating fucoid (?).

cannot really tell whether they are plants or animals. They are very fine.

"Those crinoid-eating fish often pass me. There seem to be a good many.

"Now I see a very long and thin animal. It is no larger than telegraph-wire, but is about two feet long. It moves like a snail or eel on top of the water. No: it moves like a worm. The forward part of the animal rests while it draws up the back part.

"Oh, I see! It is all covered with hairs, or bristles, about a quarter of an inch long. The head is

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sharp-pointed; and I cannot see any eyes. Every thing moves unusually slow."

("How deep is the water?") "Not very deep: the deepest not more than twelve feet.

"I see many of those crinoids washed ashore. They dry inside, and leave a hard shell that looks splendid. It is muddy in the water, but sandy along the shore. I see some crinoids sticking on the rocks, and out of the water; but they are dead. They are about two feet above the sea-level. There must have been an upheaval.

"I see some now on a hill-side thirty feet above the water; and such a lot of shells lying round like stones! Some that you have I will show you." (He pointed out *Rhynchonella increbescens* (Fig. 7) and *Strophomena planumbona* (Fig. 8) as among the

FIG. 7.
Rhynchonella increbescens.

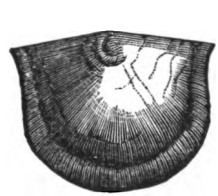

FIG. 8.
Strophomena planumbona.

shells seen.) "They are very beautiful. Those" (rhynchonellas) "are of a rosy color, and semi-transparent, very beautiful. The others" (strophomenas) "are of a translucent white, like a pearl button." (Laid the specimen down.)

In answer to questions, he said that there seemed to be a great deal of vapor in the air, so that he could not see far. "I saw rocks with cracks in them, but nothing growing on the land."

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Took the specimen up again. "I see no plant, but as strange an animal as I ever saw. (Draws Fig. 9.) It is dead, and on the edge of the water.

FIG. 9. — Strange animal.

The fore-part is horn, and the other fleshy. The under-part has a slit in it; so that it could open, and the horns cross.

"I do see vegetation now, like grass on the beach, with very fine blades like lawn-grass. It is very cloudy: I cannot see the sun at all.

"I see other vegetation now, a good deal like mullein, but no stalk. The leaves all spread on the ground. On looking closer, I see it is all divided like a fern."

(1.) No undoubted fish-remains have yet been found as low as this; but a fish of this description, destitute of teeth and scales, and having probably a cartilaginous skeleton, would leave behind it no fossil evidences of its existence. The tail is only slightly heterocercal, or unequal-lobed.

(2.) They receive their name (derived from the Greek *krinon*, "a lily") from their lily-like appearance. Crinoids have been found in the shales and limestones at Richmond, where the specimen was obtained. We find them fossilized in groups; so that they must have grown as he describes them.

(3.) This is apparently a perenni-branchiate batra-

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chian, or frog-like animal, with permanent exterior gills. In this respect it resembles the siren, proteus, and axolotl, but is much more fish-like than any of these. The oldest reptiles hitherto discovered are from the Upper Devonian; but they must have existed long before that time. We cannot expect to find the earliest reptiles or fishes in a fossil state, from the probably perishable nature of their skeletons. Further examinations will doubtless reveal many batrachian forms as old as this.

(4.) There is a strong resemblance in this to the placoganoids of the old red sandstone, known as the pterichthys and the asterolepis; and, although the skeleton was probably cartilaginous, the "crusted" scales may yet present to the geologist evidence of its existence.

(5.) This was doubtless the way that the crinoid subsisted. The mouth of the animal was in the centre of the arms; and, when they contracted, the centre of them was only a passage to the mouth.

THE TRILOBITES OF THE SILURIAN TIME, AND HOW THEY SWAM.

MAY 21, 1873.

The rocks at Braintree, near Boston, Mass., are generally regarded as primordial, — as old as or older than the Potsdam sandstone, — from the occurrence of a trilobite (*Paradoxides Harlani*) which belongs to a genus that has not yet been found above the Potsdam sandstone. I, however, think, from this and some unrecorded examinations, that the Braintree rock is younger than, or certainly as young as,

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the Trenton limestone. It is impossible for geologists to determine the age of a rock from a single unknown species, as has been done in this case. A great many statements confidently made in geological works will only remain till new and more reliable methods shall enable future students to learn their inaccuracy.

The specimen examined was a small fragment of a slab from Braintree, on which was the impression of the caudal shield of the trilobite *Paradoxides Harlani*. Examined by Sherman. Nothing known by him regarding it.

"I am about a mile from the sea. There is a great beach to the ocean, and a good many islands a little way off.

"I see some kind of an animal that looks like a trilobite; but I cannot tell whether it is or not. It is not a king-crab; for it has a great many little paddles on the under-side (1). It is about two inches long (draws Figs. 10 and 11), and has a very short tail.

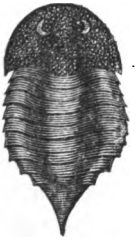

FIG. 10.
Short-tailed trilobite, upper-side.

FIG. 11.
Short-tailed trilobite, under-side.

The head is all covered with pimples like a frog's (2). Its eyes are like the eyes of insects.

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"Those paddles are quite soft and thin and translucent (3). (Draws Fig. 12.) They are in rows,

FIG. 12. — Paddle of a trilobite.

one behind another, and many in a row. There are hundreds of them, — as many as the legs on a thousand-legged worm.

"I see some in the water moving. They bend their bodies and straighten them out as they go along (4).

"I see another one, a good deal larger, and quite different. It has a plate elevated above the mouth, which looks as if it could shut down upon it (5). (Draws Fig. 13.) The mouth has a pair of nippers

FIG. 13. — Plate over the mouth of the trilobite.

like a lobster's, that are under the plate. It holds its food with that plate. There is a great deal of fine work on this animal underneath. (Draws Fig. 14.) It has a longer tail than the other, and it is all covered over with little spines. It has paddles underneath too.

"There is another animal here that looks very strange, though it resembles a trilobite. It must be a strange one if it is. (Draws Fig. 15.) The tail is very long.

"Some of these trilobites lie on the bottom, rolled up nearly as round as a marble (6). That seems to be the way in which they sleep. I see one breathing;

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and that plate over the mouth moves back and forward as it takes the water in and pours it out.

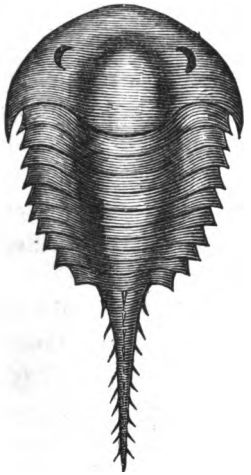

FIG. 14. — Spiny-tailed trilobite.

FIG. 15. — Long-tailed trilobite.

"They have so many paddles, they move with the greatest steadiness when they do not double up the body. They do that when they go fast (7).

"I see one doubled up that has a long tail. It stands up like a spine. All the trilobites I have seen are light-colored, like the shell of a horseshoe-crab when the animal has left it. I can see through the shell into the inside.

"I see an immense dead trilobite at the bottom of the sea. The rings have come apart; and I can see the paddles, — a row under each ring. On each side, the paddles turn outward. They are very fine and thin.

"The long-tailed trilobites like to float on the top

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of the water, and they are very lively. The little paddles do not keep time; but they are all in motion at the same time. There seems to be a great variety of trilobites here (8).

"I see one now about three inches long, with spines all over it nearly a quarter of an inch long. It has scarcely any tail at all. I see some that look just like it, only the spines seem to have fallen off.

"I think I see their eggs, — small eggs fastened to weeds; because, where the eggs are, I see a small trilobite not more than a quarter of an inch long. (Draws Fig. 16.) The eyes are unusually large for the size of the animal. The eggs are curious-looking things. (Draws Fig. 17.) The outside is like jelly,

FIG. 16. — Young trilobite.

FIG. 17. — Egg of the trilobite.

and the inside is a small brown spot. They seem to stick to the weeds, and are fastened to one another like fish-eggs.

"The eggs are very numerous: I see them on almost every weed. I do not see how this little one hangs on to the weed so well.

"I see some almost ready to hatch; and I can see the small trilobites inside. I can see them moving round inside, as if they were trying to get out.

"I can see one of those long-finned animals that I saw the other night. (Fig. 3.) It is a fish, I think. The front part is covered with plates that are flexible, like those of a soft-shelled turtle: towards the tail they are considerably harder. It is dead, lying

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on the bottom. The plates are higher in the middle; and small ridges radiate from the centre to the edges." (Improves his previous drawing.) "They are flat on the tail.

"I see another one now alive. When they want to eat, they turn over, the mouth is so far underneath. There is a soft rude tail connected with the spine: the spine passes through it. I did not see that before. It is so clear, that I can see the spine inside. It feeds only on dead animals that float on top, — trilobites and such like. The teeth are flat on top, something like a skate's" (9).

(1.) No feet of trilobites, nor paddles, such as Sherman describes, have yet been found: yet there is among geologists a general belief that the trilobite had membranous or foliaceous feet; but I feel quite sure that Sherman knew nothing of this at the time of the examination.

(2.) This is the case with many species of trilobites.

(3.) This is the reason, doubtless, that they have not been found in a fossil condition.

(4.) This motion of the trilobite, when moving, Mrs. Denton and he had previously observed, and had supposed that to be its only mode of progression.

(5.) This plate, called a *labrum*, is frequently found in a fossil state; but of its existence Sherman certainly knew nothing: yet the engravings are *facsimiles* from his drawings, the only clew to which he thus received by psychometric vision. Nothing can show more clearly the immense value of these inves-

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tigations. We shall, without doubt, be able to reproduce faithfully, in form and color, all forms of life that have existed on our planet. The means have been within our reach for ages; but we have now learned to grasp them.

(6.) Many trilobites had the power of rolling themselves up like a wood-louse; and we frequently find them in that condition in a fossil state.

(7.) They appear to have resembled the lobsters in this respect. When the lobster wishes to move gently about, it uses its membranous swimming feet; but, when it desires to dart through the water, it does this by the use of its powerful tail.

(8.) Two or three species of trilobites have been found at Braintree; but it appears that many more existed in the ocean in which these lived.

(9.) This is the fish seen with the specimen from Richmond, Ind., from rocks that are certainly as recent as the Trenton limestone, and probably no older than the Hudson-river group; and I think the Braintree rocks will be found to be as recent as this.

Mrs. Denton afterward examined, on the same day, a slab from the same locality, containing the impression of a trilobite, for the purpose of discovering how they moved through the water; but did not know where it came from, nor any thing of the previous examination.

"I see several different kinds of trilobites, and all of them different from this (1). One has spines all around the body." ("Look at the under-side of one.")

"There seems to be a light, jointed framework connected with the shelly covering of the upper sur-

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face by a thin, translucent membrane, remarkably tough, but very pliant. The joints appear to be composed of mere chips of a somewhat thicker membrane, or rather the same membrane thickened; and are united and held in place by it. This jointed frame is divided transversely and longitudinally, in, I think, exact correspondence with the transverse and longitudinal sections of the upper surface; while from every joint one or more little arms, or branches, descend, also jointed at the inferior extremity, from which joint issue several small paddles, or *paddlets*, every external edge of which is deeply fringed (2).

"These paddlets may be spread out or folded up, much like a fan, whenever the instincts of the animal require. Rapid progression through the water appears to be effected by curling up, and suddenly thrusting out, the posterior portions of the body. Whether the paddles aid in these darting movements, I cannot say; but, when the animal is slowly sailing about, they seem to be the only organs employed. When it is in a state of quiet, or rest, the paddlets have no perceptible action; but the fringes continually preserve a tremulous, wavy motion."

(1.) It is somewhat remarkable that neither psychometer appears to have seen the trilobite most commonly met with in the Braintree quarries; for its large size alone must have rendered it very conspicuous. Mrs. Denton may possibly have referred to it when she spoke of one "with spines all around the body."

(2.) The swimmerets of the lobster are fringed in this way; and it is highly probable, that, in the trilobite, the fringed membranous *paddlets*, or swimmerets,

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served to some extent as respiratory organs, as corresponding ones do in many living crustaceans. When the trilobites were coiled, they must have respired by the mouth, as Sherman saw them. He never observed these fringes, or the "jointed framework," to which, she says, the paddles were attached. It is possible, of course, that there was considerable difference among the trilobites themselves in reference to the existence and size of these fringes.

SILURIAN CRINOIDS.

About a month afterward, Sherman examined another fragment of the same specimen, knowing nothing of its character, or relation to the preceding specimen.

"I am somewhere a long way back. I see some crinoids at the sea-bottom. I see one with a head four inches in diameter. It is of a reddish-brown color." (He could not draw this well enough to satisfy him).

"I see others. They make those leaf-like arms move about, and can close them up and open them."

He laid this specimen down, and took up thoughtlessly a piece of rubber in the place of it, and then said, "I was in a forest right away. I thought there was something the matter."

Taking up the specimen, he went on: "I see a new kind of crinoid, white, and all closed up (1). (Draws Fig. 18.)

"Now I see a different kind, — quite different. I will draw that. (Draws Fig. 19.)

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"I see some coral now, or what looks very much like coral. It stands up in somewhat crooked stems,

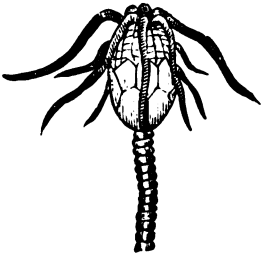

FIG. 18. — Cystidean.

like a forest, a foot or a foot and a half high, about half an inch in diameter, and nearly round. It covers a space about seven feet in diameter. On the very top I can see the animals.

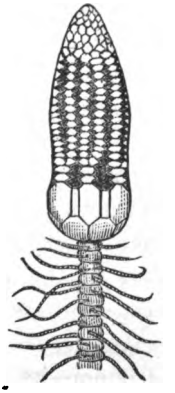

FIG. 19. — Crinoid.

"I see a crustacean like a crab, crawling along on top of the stalks, and pinching the polyps off. It is an ugly-looking thing. (Draws Fig. 20.) It is soft,

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except the claws." ("Are the claws very hard?") "No: I notice, when it squeezes hard, they bend in; but it pulls the polyps off in pieces with them, and then conveys them to its mouth.

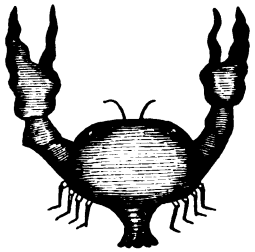

FIG. 20. — Polyp-eating crab.

"It is four or five inches long." ("Of what color?") "The body is light-colored, like a trilobite; but the claws are a dark-brown.

"I see pretty well; but I do not see very fast. I am on a hill at the sea-bottom.

"There are a great many of these polyps." ("Any sea-weeds?") "Yes: a great many fine ones like Irish moss. I see no large ones.

"Now I see something I cannot account for. I see a stone in between four of these coral stocks, a foot from the ground (2).

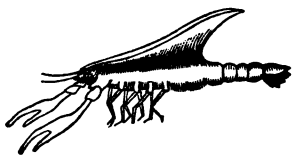

FIG. 21. — "Curious-looking crustacean."

"Now I see a curious-looking crustacean. I think it will look best sideways. (Draws Fig. 21.) It is

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not more than half an inch long. I thought it was alive; but it is dead, and this is merely the shell (3). I see several alone now.

"Well, I see part of a shell of a trilobite. It must have been a very large one.

"I can see a place where a trilobite has shed all its spines. There are a handful of them together. I should think you might find rock with trilobites' spines in, fossilized."

(1.) This, from its appearance, is a cystidean, — an animal allied to the crinoids, and to the echinoderms, or sea-urchins. The cystideans have not been found out of the Silurian formation.

(2.) The stone was probably taken up from the sea-bottom by the root of a fucoid, and dropped there.

(3.) Crabs have not been found by geologists lower than the Permean. The two crustaceans seen during this examination approach the long-tailed crustaceans more than most living crabs. These engravings must not be considered accurate in every detail, as the animals are only roughly sketched at the time, and finished when it is difficult for him to remember the exact appearance.

I have no doubt whatever that a psychometer could draw for a lifetime, and not exhaust the life-forms of the silurian alone. The early oceans swarmed with varied forms of life, and some, to all appearance, identical with living forms.

ANIMALS AND PLANTS OF THE COAL-PERIOD.

The great abundance of vegetable-life during the time when the coal-beds were deposited is now uni-

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versally admitted. The great variety of that life is becoming more evident from day to day as new forms are being brought from the darksome mines to the light of day. But, in the nature of things, we have discovered, and we can only discover by present methods, a few ruined fragments. What plants there must have been, whose leaves were too large or too delicate to be preserved! what fungi, whose texture entirely unfitted them for preservation! Of the leaves that have been found on the pages of the great stone-book, how little we know of the trees on which they grew, and how much less of the fruit they bore, and of the insects that buzzed around them!

The animal life of this period, as known to the geologist, consists exclusively of radiates, mollusks, a few articulates, fishes, and amphibians. Of the land animals we know scarcely any thing; and what Lyell wrote fifteen years ago is still true: "We have ransacked hundreds of soils replete with the fossil roots of trees; have dug out hundreds of erect trunks and stumps, which stood in the position in which they grew; have broken up myriads of cubic feet of fuel still retaining its vegetable structure; and, after all, we continue almost as much in the dark respecting the invertebrate air-breathers of this epoch as if the coal had been thrown down in mid-ocean." *

Psychometry is the glass that enables us to see those distant lands, and all that lived upon them; and it will yet make them almost as well known as those on which the sun shines to-day.

* Lyell's Manual, p. 402.

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COAL-PERIOD IN MASSACHUSETTS.

JUNE 16, 1873.

With a specimen of sub-carboniferous conglomerate from Fall River, Sherman came into *rapport* with what seems to have been the vegetation of the coal-period, and the animals existing at the time.

"I am in a thick forest, where the trees grow in water two or three feet deep. They look like coal-trees that I have seen in geologies. The bark is very rough. (Draws Fig. 22.) There are no limbs; and the top spreads out like a palm. The leaves are long but not broad. I will draw the end of one. Some are six feet long (1). (Draws Fig. 23.)

FIG. 22. — Rough-barked "coal-tree."

FIG. 23. — Leaf of the same.

"The trees are so thick here, that a race-boat could not be pushed through among them. They are so straight and tall, that, if only a few were left, it seems as if they would fall. They appear to hold one another up. They seem to be very soft-bodied, and to grow very fast, it is so moist here. The top

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of the trunk is green, like the stem of a weed, and juicy.

"There seems to be very little other life. I do not see any insects even.

"Now I see some animals that look like young crocodiles. (Draws Fig. 24.) The feet are webbed.

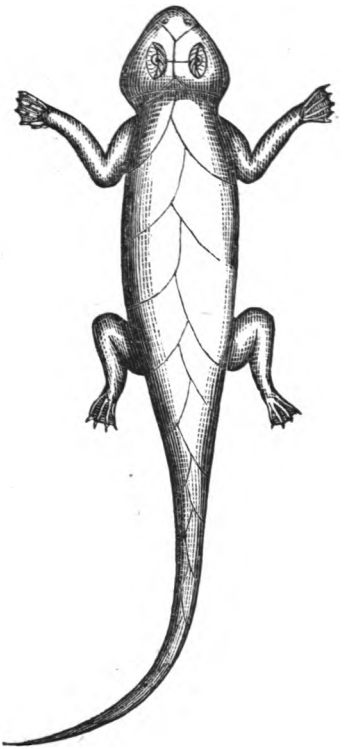

FIG. 24. — Broad-headed reptile.

There are four long toes, and a very short one, on the fore-feet, and only four on the hind-feet."

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("How large are they?") "One is about two feet long." ("What color?") "Very dark brown; nearly black. The hind-toes are much larger in proportion. It has few scales: they are large and soft, and can hardly be called scales (2).

"They seem to live on vegetables. I see one inside of a tree. It has eaten its way in; and its tail is sticking out. They are quite common." ("What are the teeth like?") "They are very small and sharp (3).

"The wood is very soft. They take it out by the mouthful, and spit it out. I guess they do not feed on it as I thought.

"Well, well! I see a hole in a tree. It is one of those lizard's nests, with eggs in it; soft like a turtle's, about the shape of a partridge's egg, and nearly white. There are four of them. The nest looks like a bird's nest.

"This is not nearly all they lay. I see in another nest as many as forty-six. They are heaped up.

"I see some of those reptiles climbing up trees. They climb pretty well: but they look curious, going up trees with their webbed feet; but I see none very high."

("What do they live on?") "They live on an animal like a water-bug. They catch them in the water, and come up to eat them. They have a hard shell: I should think they might fossilize. (Draws Fig. 25.) They are about an inch long.

"Many young trees are just coming up out of the water. They are white like a cabbage, and about that size. They are translucent; and you can see

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the leaves coiled up inside. (Draws Fig. 26.) They must grow very fast.

FIG. 25. — Ancient water-bug.

FIG. 26. — Bud of a coal-tree.

"A great many old and decayed trees have fallen down. There is a curious smell, like marsh-gas or sink-water. I do not like it: it seems as if it would choke me. The air seems dry to breathe; though there must be a great deal of moisture. There seems to be something wrong about it. That may be the reason there are not more animals (4).

"The lizards' nests are about a foot above the water level." ("What is the temperature like?") "Not extremely hot; about the same as here." (Eighty degrees Fahrenheit.)

(1.) This tree is apparently a sigillaria, one of the most abundant of the coal-measure trees.

(2.) The resemblance of this to some of the reptilian forms found in beds of the carboniferous formation is very great. It seems to have united some of the characteristics of the lizard with some of the frog. The living animal that it is most like is the plestiodon, or scorpion-lizard, which resides in trees, generally thirty or forty feet from the ground, and frequently makes its home in the deserted nest of a woodpecker. One species is said to attain the length of twenty-five inches.

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(3.) Several small reptiles have been found in the trunks of sigillaria, bearing considerable resemblance to the one Sherman has figured. In 1852, Profs. Lyell and Dawson discovered in the Nova-Scotia coal-measures two small reptiles in the interior of an erect tree; and, since then, Prof. Dawson has discovered four small reptiles in the interior of another. It seems quite likely that these reptiles were overtaken by a flood, and buried up with sand or mud while in their nests.

(4.) There was doubtless much more carbon in the atmosphere at that time; and that may account, in some measure, for the paucity of air-breathing animals which he notices.

WANDERINGS IN A PENNSYLVANIAN COAL-FOREST.

JULY 11, 1873.

The specimen examined was a piece of shale containing the impression of a fern-leaf from near Pottsville, Penn. Specimen seen. Examined by Sherman.

"I am in a coal-forest. I see a greater variety of trees than I ever saw before in the same period. (Draws Fig. 27.) The one I am drawing now has no branches, but long leaves that reach from the top nearly to the ground. They are as much as, or more than, ten feet long. The tree is small. It grows under the shade of the large trees.

"Some of the trees are quite deep in water, — six feet, I should think. They are like water-plants. I see a strange one, tall and slim, and that leans over. It is deep in water too. The points of the leaves

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are all turned toward each other. These leaves are as long as a man, and hang down by what look like

FIG. 27. — Long-leafed tree.

ropes. All up the trunk are what look like small leaves. (Draws Fig. 28).

"I see another curious leaf on a tree that is bent over, and has a long, small trunk. The bark is quite smooth. (Draws Fig. 29.) The leaf is three or four feet long (1).

"Here is a very beautiful little plant. It seems to be an air-plant, and clings to the trees. I hardly ever saw so pretty a plant. (Draws Fig. 30.) The roots twist round the trees. It is nearly of a brick-red color, but is black at the centre of each curl, where there is a white blossom that looks like the silk of the silk-weed. An immense number of fine white silky threads come out of a black centre that forms a kind of cup. Some of the plants are a foot long.

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I see one open now; and inside are one pistil and six red stamens, and then those silky threads. These plants only seem to grow on trees that are slanting.

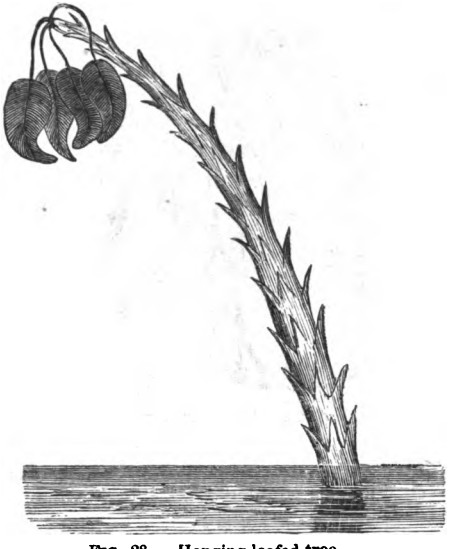

FIG. 28. — Hanging-leafed tree.

"I see another quite handsome air-plant clinging to the trees with its roots. (Draws Fig. 31.) It has a bulb about an inch in diameter at the bottom. At the top is a kind of blossom of a dark red: the rest is green. There are a great many of them (2).

"I see that great tree-fern that I saw before and drew (Fig. 22). There are many of them.

"This (Fig. 32) looks like a large tree two feet in diameter; but it is nothing more than an immense reed, perfectly hollow, about half an inch thick. (Draws Fig. 33.) An axe would go through it at one blow.

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"There is something curious about these hollow trees. They stand in water six feet deep; and you

FIG. 29. — Large fern-leaf.

can look in to the bottom, and there is not a drop inside. The roots are hollow, going off from it; and there is none in them."

FIG. 30. — Parasitic plants. — FIG. 31.

(1.) This is evidently a fern-leaf; but it differs from all that I have seen figured: indeed, all the plants figured during this examination appear to be peculiar.

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(2.) Air-plants are found to-day almost exclusively in warm and moist regions, and they prefer shady

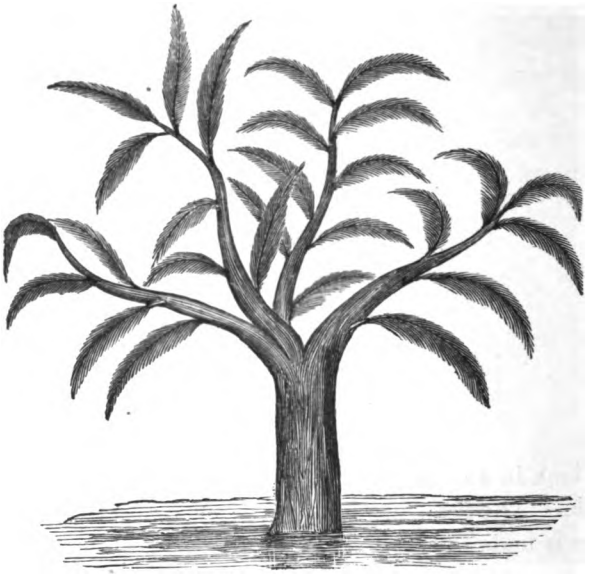

FIG. 32. — Hollow tree.

situations. The climate and forests of the coal-

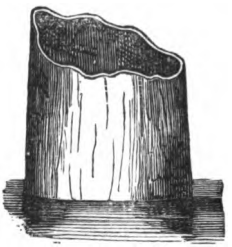

FIG. 33. — Part of the trunk showing the interior.

period must have been peculiarly fitted for their development.

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About a week afterward I tried him with another specimen of shale from near Pottsville, Penn. On this occasion, nothing was known by him regarding it.

"I seem to be in an extremely thick wood, and I see some singular-looking trees. (Draws Fig. 34.)

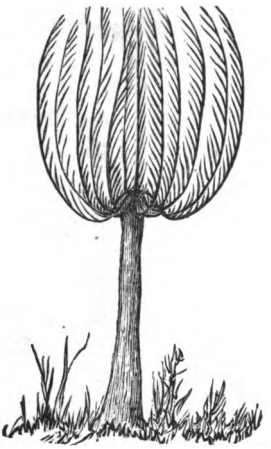

FIG. 34. — Soaring-branched tree.

They are not tall: the trunk is not more than ten feet high. They do not seem to be deeply rooted, or the ground is very soft. Dirty-looking streams run through here.

"I see some curious kind of land-snail, that seems to be round the stump of a tree. (Draws Fig. 35.) I see others, and some round live trees. The shell is tightly attached to the tree. I see the marks of some on trees that have grown too large for them.

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"It is not a shell, but the covering of an animal, — its house. It can leave it. It is not a snail, but a

FIG. 35. — House of a crustacean.

crustacean; and it is very nimble. (Draws Fig. 36.) Sometimes there are two in the same shell. I see a very curious one. The tree has branched, and the shell branches, so that it can go up either. They are good climbers. Some are on the tops of trees thirty feet high." ("What do they feed on?") "I see one feeding on a worm that it has pulled out of a hole in the tree. It stops out of the nest for some time.

FIG. 36. — House-building crustacean.

"I see some now making their houses. They begin at the large end, and use some kind of mud. They make it thin with their teeth, which are large and flat, one on each side. It looks dark when first put on, but becomes lighter afterward. It is polished in some way on the outside; so that it looks like shell. The animal is five or six inches long.

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"I see mud sticking on the hair of the tail. After they get up, they take it off with their claws, and use it. They are laden with clay as bees are with pollen.

"I see another singular crustacean, that does not live on trees. It has a dirty look. (Draws Fig. 37.) The claws are large in proportion to the body.

FIG. 37. — Oval-bodied crab.

"I see a very handsome horned land-snail. (Draws Fig. 38.) It is yellow and black. The four horns at the top are yellow. It is about three inches high; and has three whorls, large and thick. They must increase with age; for I see some young ones, with only one bulb and four small horns.

FIG. 38. — Four-horned land-snail.

"Here is something like Neptune's cup: it is hollow at the top, and is, I think, a kind of fungus. It is nearly black, and four feet tall, and quite even. (Draws Fig. 39.) It is very soft inside; and there are pimples all over it, but quite soft.

"It will hold water. I see some with water three inches deep in them.

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"I see some old ones that have died, and left only the skeleton; and that looks prettier than the living plant. (Draws Fig. 40.)

FIG. 39. — Cup-fungus.

FIG. 40. — Skeleton of cup-fungus.

"One of them is taller than I can reach. Five or six persons could stand in it, if it would bear them. It is not as tall, for its size, as the other.

"Another fungus is something like a puff-ball. The dust keeps rising from the top like smoke. It is about a foot in diameter; and the dust keeps slowly rising all the time like steam. (Draws Fig. 41.)

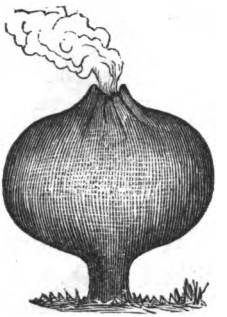

FIG. 41. — Ancient puff-ball.

"This is a great place for fungi. The black cups are very conspicuous. I see them everywhere in great numbers. Another kind is curled over at the

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top. It is brown: most of them are black. (Draws Fig. 42.)

FIG. 42. — Curly-topped fungus.

"Some of those fungi must have sent out that dust for a long time; for it has gathered on the under-side of leaves above them. The leaves being damp, it has stuck to them (1).

"I see a very handsome moth on a leaf. (Draws Fig. 43.) The body is about four inches long. The

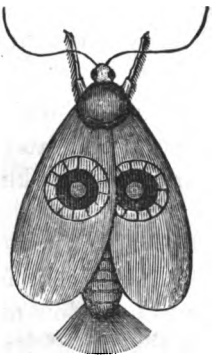

FIG. 43. — Hair-tailed moth.

wings are not spread. The colors — brown, red, and blue — blend into each other. It has white radiating hairs for the tail" (2).

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(1.) There must have been a great many fungi at a time when heat, moisture, and shade were so favorable to their development; and, for the same reason, we may suppose that they would attain an unusual size; but, owing to the softness of their structure, the geologist knows nothing of their existence.

(2.) Insects have been found by the geologist as low as the Devonian; and dragon-flies, ants, locusts, beetles, and a small moth, it is said, in the coal-measures. Some favorable locality in these beds may yet yield us other moths and butterflies, which the psychometer finds at that time, and which the necessities of the plants of the period would seem to require. The fruits of the time, many of which have been recently found in the carboniferous beds of Illinois, indicate flowers that preceded them; and these, insects that assisted in their fructification.

ANIMALS AND PLANTS OF THE COAL-PERIOD.

AUG. 5, 1873.

Specimen of black shale, containing impressions of ferns from a coal-mine near Pottsville, Penn.

"The first thing I see is a snake." ("Are you in a coal-forest?") "Yes; but the ground is high. There are brown blotches across the body. It is a light ash-color, and five or six feet long. (Draws Fig. 44.) It seems to be a slow mover. It is hanging on a branch by the tip of its tail. Its head is very large for the body (1).

"It is not slow when any thing is to be devoured. A grub was just coming out of a hole in a tree near; and it seized it instantly, and pulled it out.

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"These grubs are very destructive to the trees. I see a tree with the bark off; and the whole is hollowed out in square holes, as far as the tree is large enough. (Draws Fig. 45.)

FIG. 44. — Broad-headed snake.

FIG. 45. — Trunk eaten by grubs.

"There is just enough wood left to form a partition between one cell and another. The cells are all of one size from bottom to top. These cells are where they live. In other trees the bark is on; but they are just the same inside. There is only a round hole to tell where they are. All the holes are on one side of the tree. The grubs are black.

"It is a palm-like tree, with large leaves; perhaps a dozen on each tree.

"There is a terrible thunder-storm now. How the lightning darts! It sets the woods on fire in several places. When the fire gets to the trees where the grubs are, you can hear them pop and *siz*, one after the other, as it roasts them.

"I saw the lightning strike some dry trees, and burn; but, when it came to the regular coal-trees (sigillaria, &c.), it stopped. They seem to be too moist to burn."

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("I wish you would go up high enough to see over the face of the country.")

THE OCEAN DURING THE COAL-PERIOD.

"I have got to the ocean. It looks horrible! — all covered with logs, trees, and branches, and even floating islands, with trees growing on them. All that the tide can do is to lift this mass up, and let it down." ("Are you sure it is the ocean?") "I cannot see across it; and it is salt.

"In another place I see where trees have grounded, and formed a fixed island, with trees to the very bottom. On it are very tall trees, and many forms of vegetation. The trees, grass, bushes, vines, and logs are piled up all along the coast, and for eight or ten miles broad (2). It looks like desolation. It is enough to make one sick to look at it. It looks pleasant toward the land.

"That is very strange! I see dim flickering lights among the decaying logs. The trees are piled up in places, so that there are dark caverns; and there I see them. They go out, and then come in again" (3).

("Go out on the ocean.") "I see how they get piled up: it is done by the dashing of the waves. They are piled up fifty feet high, I believe. There are many stray logs, brush, twigs, and stuff on the ocean, and trees, with vines twisted round them, floating about. In storms they are dashed up on the heap. The waves come in in great swells. It would take an hour to walk a mile here.

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"I see a strange kind of blossom drifted out here, but quite fresh. (Draws Fig. 46.) It is nearly red, or light red."

FIG. 46. — Pentremite.

(I looked at the drawing, and said, "Are you sure that it is a blossom? Put it in the water.") "I see one in the water. It is stuck to a log in the water." ("What do you think of it now?") "I rather think it is a radiate; but it looks just like a flower, with a pistil and several stamens. It is quite hard. I should think it would fossilize. It has what seems like a sucker, with radiating roots, by which it attaches itself to things" (4).

(1.) Serpents have not yet been found in the rocks below the tertiary formation; but, from the great size of the lowest yet discovered, — twenty feet in length, — we may expect to find them much earlier than this. The one figured here has a much larger and broader head, in proportion to its size, than that of any living ophidian.

(2.) Although most of the beds of coal have their accompanying under-clays, with roots ramifying through these soils in which the coal-plants grew, yet it is highly probable that some coal-beds were formed along the margins of the carboniferous seas from the abundance of vegetation swept down by the streams from the luxuriant forests that overspread the country.

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(3.) Decaying vegetation produces similar phosphoric emanations to-day.

(4.) This radiate animal, which he mistook for a flower, is evidently a pentremite, which, like the cystidean, forms a link between the crinoids, or lily-like animals, and the echinoderms, or sea-urchins. It was supported by a jointed stalk like the crinoids; but in the shape and character of its plated receptacle, and in the absence of arms, it resembled the echini.

FLOWERS IN A COAL-FOREST.

AUG. 6, 1873.

The same specimen.

"I see a coal-forest, and a curious kind of plant about a foot high, with a green blossom. It springs right out of the ground. It has only three petals. (Draws Fig. 47.) It is surrounded with arrow-

FIG. 47. — Green blossom.

shaped leaves. There are so many stamens, I cannot count them; but only one pistil.

"I see a very handsome plant now, about ten feet high, with a large red-and-yellow flower on the top.

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(Draws Fig. 48.) The plant looks something like a sun-flower, and the flower has a perfect cross on it.

FIG. 48. — Cross-flower.

"I see some curious pods on a tree, something like locust-pods. They are green. They hang in clusters. The tree has very fine leaves. (Draws Fig. 49.)

FIG. 49. — Pod-bearing tree.

"There is an extremely large pitcher-plant here, eight or ten feet tall. It is reddish-brown, and the

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leaves green. (Draws Fig. 50.) It is full of water. It has a graceful look (1).

FIG. 50. — Gigantic pitcher-plant.

"An air-plant is growing on the under-side of a limb, and hanging down: it has a pale-blue blossom. The plant is dark green, and the centre of the blossom dark blue. (Draws Fig. 51.)

FIG. 51. — Ancient air-plant.

"One tree has fallen between the trunk of another and one of its limbs; and there the tree has grown till

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the one that fell is in the centre of it; but it is dead. The trunk looks as if it were shingled.

"There is an insect here very much like a mosquito: but it is not one; for I see it sucking the juice that comes out of a tree. The juice is very sweet. It seems to me that these trees are full of sugar. The sweet juice is running down the tree in a small stream. I have noticed it running out of these trees before (2).

"I see handsome green fungi all over the trunk of a tree that has fallen down. They are the shape of a toadstool at the top, about as large as a nickel cent, and eight or ten inches high."

TREE-CLIMBING MUSSEL.

"I see a kind of mussel out of water, and hanging on to a tree like a mussel to a rock. There is a small muddy stream about six feet from the tree: the water looks like that which flows from swamps. The shell is striped with different shades of green. The tree hangs over the water.

"It is not uncommon. I see some of them twenty feet above the ground. When any thing touches them, they squirt a stream of water in that direction. I saw a beetle come up to one: it shut in its head and legs as quick as possible.

"They go up a tree in a spiral, eating into it all the way up; so that the mark looks like the thread of a screw. The bark of the tree is as smooth as birch, and soft. There are about twenty trees here that have numbers on, some very small. The trees are all scored. At the bottoms of some trees I see hundreds of shells that have fallen down. All the trees are

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close to the brook. I see six all together round a little knot.

"On one place, where the sun shines through the trees, I see three or four dead: they are cracked open, and dry inside" (3).

(1.) The pitcher-plants of the present time grow in boggy situations.

(2.) Sherman has frequently noticed sugar-bearing trees, not only in the carboniferous formation, but in some of the younger, up to the pliocene tertiary; and has observed monkeys breaking the branches of the trees, and sucking the juice.

(3.) At a time when the atmosphere was as moist as it was during the coal-period, it would be easier for mussels to do this than at any more recent time. They probably obtained from the bark of the tree all needed sustenance.

COAL-PERIOD IN RHODE ISLAND.

AUG. 4, 1873.

The specimen examined was a piece of bituminous shale, containing impressions of ferns, from Valley Falls, R.I. Specimen seen and known.

"Well, I do not seem to be exactly in the right place. I am up where it is high. There is no water, but a great many trees. The bark of the trees looks much alike; but the leaves are about as different as they can be. (Draws Fig. 52.) No two lobes are alike.

"I see another very strange leaf somewhat on the same plan. (Draws Fig. 53.) The first one is about six inches long, and this about a foot. They are very thin.

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"One tree has leaves that are glossy, and look as if they were varnished. They are quite thick, and about

FIG. 52. — Unlike-lobed leaf.

FIG. 53. — Four-lobed leaf.

three or four inches long. (Draws Fig. 54.) The tree is perhaps fifteen feet high.

"This is the strangest leaf. It is on a very tall tree, but is not more than five inches long. (Draws

FIG. 54. — Thick glossy leaf.

FIG. 55. — Compound leaf.

Fig. 55.) The lobes are the same shape, and the leaf is about as thick, as an oak-leaf.

"Some extremely large leaves grow on a plant about ten feet high, and reach from the top to the

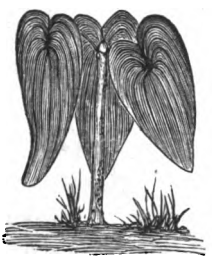

FIG. 56. — Three-leafed tree.

bottom. (Draws Fig. 56.) There are only three

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leaves on it. It has a singular-looking green fruit, about a foot high, on top of the stalk. (Draws Fig. 57.) I do not think the fruit is ripe. It is like an acorn in its cup. The veins in the leaf are very distinct, and have deep hollows between.

"There is a curious leaf on a thick-bodied tree about fifty feet high. (Draws Fig. 58.)

FIG. 57. — Fruit of three-leafed tree.

FIG. 58. — Tapering pinnate leaf.

"I see some very strange-looking flowers now growing on a plant about two feet high. They are nearly all pink; have six stamens and one pistil nearly black. The very edge of the end of the stamens is black, and

FIG. 59. — Large-blossom plant.

the rest pink. (Draws Fig. 59.) It only bears one

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blossom. The stalk is square; and on the edge are little spines that make it look like sickle-grass.

"There is a very fine tree full of splendid-looking fruit. It is yellow, and about two feet long. (Draws Fig. 60.) The branches bend over with it. There is a fuzz on the outside, such as a peach has.

"It has a very pleasant taste, very much like a pleasant sweet apple, and is very juicy. A whole one would be about as much as a person could eat (1). Where the fruit has fallen, there are many beetles feeding. The largest is a light-brown one, with large nippers. (Draws Fig. 61.) It is about five inches

FIG. 60. — Large yellow fruit.

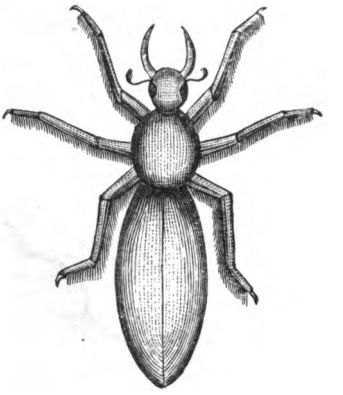

FIG. 61. — Fruit-eating beetle.

long. It keeps its nippers going all the time. There are a great many beetles here, and even land-snails too. Would they feed on these fruits?

"I will draw another beetle, — the strangest one I see. It is metallic green, very handsome. (Draws Fig. 62.)

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"I see a very curious land-snail. The shell only covers a part of the body. I do not know how to account for it. The animal looks as if it were inside

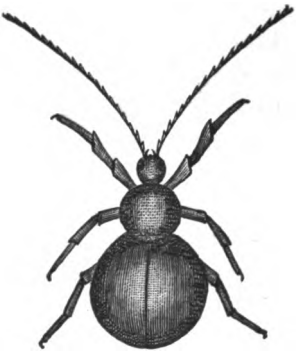

FIG. 62. — Metallic green beetle.

of a spiral spring (2). One can see the body black, while the shell is white. (Draws Fig. 63.)

FIG. 63. — Rib-shelled snail.

"These beetles fly round in the daytime; and there are a great many wasps and bees."

(I thought it possible that he had unconsciously passed to some other period; and I said, "Are you sure that this is in the same time?") "Yes," he said: "it is. I see one of those hollow trees (Fig. 32), and one of those ferns (Fig. 22).

"One kind of insect is a wasp, black and yellow; another is like a honey-bee, but a little smaller; a

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third like a bumble-bee, but larger. They are sucking the sap that flows from the trees (3).

"Insects flourished then: there were neither birds nor reptiles to catch them.

"I see a kind of melon on a vine on the ground. It is about a foot long, and six inches through."

(1.) It has generally been supposed that nutritious fruits made their appearance upon the globe a short time only before the advent of man; but this, like a great many conclusions that have been found quite erroneous, rests merely upon negative evidence.

(2.) Land-snails have been found in the coal-measures of Nova Scotia and Illinois.

(3.) The earliest bee known to the geologist is incased in the amber of the tertiary; but, as there were certainly flowers in the coal-forests, why not bees?

Before the statements made in these examinations can be accepted, they need to be verified by the independent testimony of other psychometers. Many other examinations I shall reserve until I have had an opportunity of thus verifying them, and establishing their correctness beyond all reasonable doubt. The harmony of most of the statements advanced, with what we know of the carboniferous period, must be apparent to any one conversant with that time as geology reveals it.

THE CONNECTICUT VALLEY AND ITS ANCIENT INHABITANTS.

The valley of the Connecticut, from the Massachusetts line to Long-Island Sound, is one of the most

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interesting regions in the world to the geologist. In this valley we find sandstones, which are, in the aggregate, thousands of feet in thickness, as revealed in places by their upturned edges; and through them, over a space about a hundred miles long and from two to four miles broad, are found the tracks of a great many animals, some of them so remarkable, that it has seemed to many persons incredible that animals ever lived whose feet could have made such monstrous impressions. By the labors of Dr. Deane, Dr. Hitchcock, and others, much light has been thrown upon the strange forms that wandered along the muddy shores of gulf and river, and left their autographs on the red pages.

But, if it is difficult to construct an animal from its bones, how much more difficult from its tracks! It was long before Dr. Hitchcock could be satisfied that any of the tracks were made by birds; though they generally have long been called "bird-tracks:" and even to-day there are geologists of some eminence who deny that we have any evidence that birds existed at the time of the deposition of the sandstones of the Connecticut valley.

Can psychometry repeople this valley? Can it lower the whole country, call up the ancient tides, and leave the broad beaches covered with red mud as they recede, and send the monstrous birds and strange reptiles down to fish as they did in that time so long ago? The following examinations, which are only a small portion of those that have been made, will reply.

The specimen examined was a fragment of a sand-

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stone slab from Turner's Falls, containing footprints. Examined by Mrs. Denton in 1866. Nothing was known by her regarding the age or locality of the specimen.

"I am in a river-valley with this specimen, and in the long-past time. The animals and vegetables were very different then. (There are several different influences; and I can follow one nearly as well as another.) I see people now. One minute I am back beyond all human beings, and then I am among early people and later times. The true time of this is, however, a long way back of the human period.

"The river of this valley overflows its banks, and settles back into the land, forming shallow ponds and lakes. It is a dirty stream. There are wide, shallow places in it, where it does not look so much like a river. It seems to grow wider as I look at it, and has more the appearance of a shallow sea. This is a long way back in time. The air is loaded with fog or steam: I think it is steam (1). I do not like the feeling at all. There seem to be abominable things all around; but I cannot see them. The water and mud below seem stirred by animals all the time. Land and water are both very warm; but it does not seem to result so much from the direct rays of the sun as from the geological and geographical conditions of the region.

"There is a place at some distance to the west that looks high and dry and pleasant; but it is very rocky." ("Taste the water.") "I cannot. It is filthy. It seems brackish. This is, I believe, an arm of the sea, extending a long way into the land. It is

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the dirtiest place I ever got into. I cannot bear to stop here. I obtain glimpses of animals, but nothing distinct in that line. Judging by the feeling, there are many reptiles here of various kinds, and many fowls that seem to live almost as much in the water as out of it. Even they do not seem like neat water-fowls; but they have waded and wallowed in this filth until they appear to have become part and parcel of it. Their flesh is sinewy, and has an exceedingly strong and disagreeable odor, from which no amount of washing could cleanse it. A terrible stench arises from the whole region; so that I think no human being, certainly none who lives now, could exist within many miles of it. I cannot compare the sensation I experience to any thing I ever knew or conceived of before. The water itself is impure. It holds something besides salt in solution. I have never before seen so filthy a place. Nothing but fire could ever purify either the place or its inhabitants.

"I see a bird now that looks like a Connecticut-valley bird (2). It has those same coarse feathers. It is large and long. The legs are very long. It is close to the river. The water is purer now, and runs more like a river. (This seems like a more recent time.) There are immense numbers of small fishes in the water, that furnish food for birds. These are a cleaner kind than those I sensed before. They are of a brownish color, but have not feathers all over them. The skin is dark colored. I think some of them must be as much as six feet high. The feathers are principally on the edge of the wings, and on the back.

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"I think this is the Connecticut valley; but it seems farther back in time than the specimens I have examined before."

(1.) While the sandstones of the Connecticut valley were being formed, the valley appears to have been subject to considerable disturbance. At times it was an arm of the sea, even beyond where Turner's Falls now is; then the valley was uplifted, and a river ran through, and over rocks, to the ocean below; and these conditions seem to have alternated several times. Accompanying these changes of level was the formation of crevices down to the fluid interior, from which were poured streams of lava. Portions of the trap-beds formed from those streams are at this time a remarkable feature of this valley.

(2.) In previous examinations, some of which are recorded in the first volume of "The Soul of Things," she had seen birds with coarse feathers.

BIRD-TRACKS OF THE CONNECTICUT VALLEY, AND THE BIRDS THAT MADE THEM.

In 1867, Sherman examined a small piece of a slab from Turner's Falls, above Greenfield, on the Connecticut River, knowing nothing of the specimen.

"I see a track on the mud: it looks like a bird-track. I'll measure it. It is thirteen and a quarter inches from the heel to the end of the claw (1). Would you track it up?

"I have come across the bird. It is a great, long-necked thing, and has a very large body. I can just

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put my elbow, on tip-toe, to the top of the hip" (four feet five inches). "The body — oh, such a big body as it has! It is short-legged for the size of the body. It is eighteen inches round the neck, and six feet eight inches round the body just behind the legs. It is real clumsy. It is not a flying-bird. It has little, short wings; and it flap, flaps them to help itself along. There are as many as a hundred of these birds walking along. They are running now; and this one opens its mouth, and runs toward them. They are larger than it. It is one of the smallest of the lot, except some young ones I see. The tail-feathers are short, fine, and bunchy, like a dodo's tail: they are white. The feathers on the body are brown; some a very dark red, almost brown (2). (Draws Fig. 64.)

"Now they are going along, making tracks. One of the birds is very large. I can just reach to the top of his hip with my middle finger. The bill is not very long, and does not go to a peak, but is rounded. They eat green grass, and a white kind of weed that grows on the land. They reach up to a tree with large leaves, and eat them too."

(1.) The measures were made with a common tape-measure. He slid the tape along with his fingers, his eyes being closed, till the place was reached that seemed to him right; and I read off the numbers.

(2.) This is probably one of the smaller species of a bird, whose tracks are quite abundant in the valley of the Connecticut, named by Dr. Hitchcock *brontozoum*. The tracks of the *brontozoum*, however, do not give any indication of webbed feet, and the toes

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appear wider than these are indicated: but, where the mud was soft enough to receive the impression of the web, it may have been too soft to retain it; if harder, it may have been too hard to receive the impression. The tracks would generally be wider

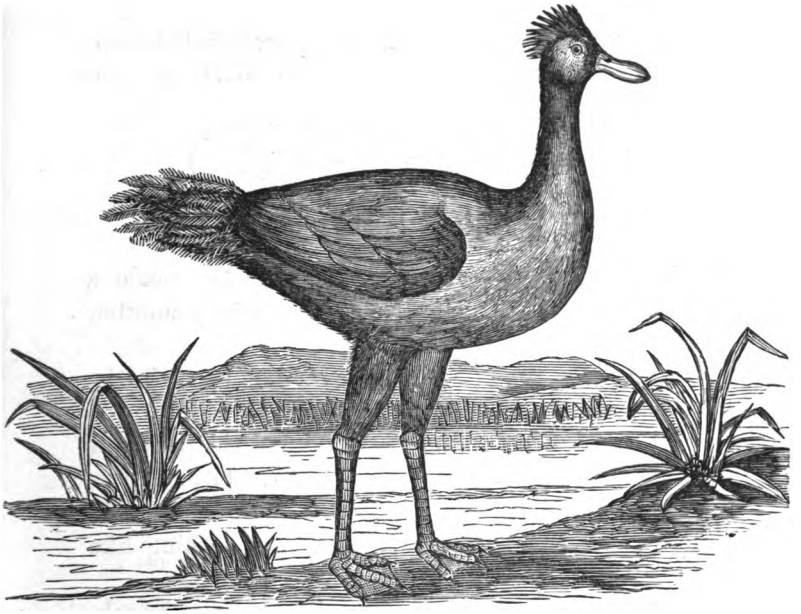

FIG. 64. — Large web-footed bird of the Connecticut.

than the toes. The engraving represents a bird that resembles the ostrich more closely than any other existing form: but its neck is shorter and larger in proportion, while its body is smaller; and it has a crest, of which the ostrich is destitute.

I gave him for examination, about two months ago, a small piece of shale from Sunderland, above North-

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ampton, in the Connecticut valley. It was from a slab containing fossil fish. He knew nothing about the specimen, but described very similar birds.

"I seem to be near a small body of water, — I suppose a pond, but long. I see something like a water-newt.

"Here is the track of some large, web-footed monster, I know not what. (Draws Fig. 65.) It is as

FIG. 65. — Tracks of a larger web-footed bird.

much as a foot long. I see where it has made a scrape, as if with a nail; and then comes another track.

"A curious kind of worm is crawling along in the mud.

"I am following these tracks around the pond. I see now what makes them: it is a large bird, that is sitting down. It is much larger than an ostrich. (Draws Fig. 66.) I have seen one something like it, but not exactly" (1).

("What are the feathers like?") "On the neck, back, and breast, they are fine; on the wings and tail, coarse. Most of them are dark brown; but the tail is a little lighter than the rest.

"I see a number of those ponds all strung along like sausages, and about that shape too. These birds are gobbling up great frogs, larger than a bull-frog, but almost the same shape and color. I see one bird at each pond. The ponds are all joined by small streams.

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"These birds go strutting along, not hopping like the kangaroo-reptiles."

FIG. 66.—Larger web-footed bird of the Connecticut.

("See where the water from those ponds flows, and examine the country.") "It is very flat. On each pond is a kind of beach; and between them prickly bushes grow very thick. It would be impossible for a man to make his way through them.

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"I see a river now, flowing very slowly, ten or fifteen miles from the ponds. The streams from the ponds unite, and flow into this large river.

"Those birds go round like great Shanghais. The tail is not as white as that bird's I painted (Fig. 64). Its legs are bare, — so bare, that I can see the flesh through the skin, — and very large. It could not fly, but would sometimes hop, and flap its short wings.

"I see another one, larger than the first. My finger-ends can just rest on the top of the leg" (six feet eight inches).

(1.) Many different species of gigantic birds frequented the Connecticut valley during the deposition of its sandstones, and many whose footprints may never be discovered.

This must have been a bird about twelve feet high, or as large as Hitchcock thinks the largest bird was whose track has yet been found.

THE KANGAROO-REPTILE.

The specimen, which was a slab containing a footprint, from South Hadley, was examined by Sherman on June 21, 1873. He knew what it was, and that it came from the Connecticut valley.

"I see a large river; and on the sides are muddy banks for miles, and hardly any vegetation near: the mud is pretty hard, — dried by the sun. It seems to overflow its banks, and make it muddy for a mile or two back from the river, the banks are so low. Here and there are bunches of bushes, with mud all round them, that look like islands.

"I see a turtle, with a shell about two feet long.

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It seems harmless, and does not differ much from turtles we have now. It has a blunt nose. There is green moss on its back.

"Away up on the side of this muddy place are hundreds of those turtles laying their eggs. It is quite sandy up here. There is another kind, with very long claws, that bend up in the middle when it walks; so that only the heel and the points of the claws reach the ground.

"I see some kind of a reptile with a long tail, short fore-legs, and long hind-legs, that goes like a kangaroo (1). (Draws Fig. 67.) The skin is bare and leath-

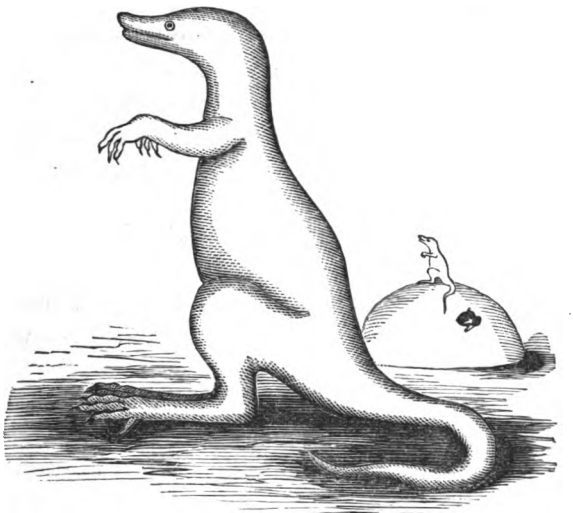

FIG. 67. — Kangaroo-reptile.

ery, and quite dark, — a very dark brown. Its head is very long." ("How many toes?") "I thought it had five on each foot; but I find it has four on the

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hind-feet, and three on the fore-feet. Its fore-feet are not used much, except when it is eating. It takes its food like a squirrel, — with its fore-feet. Its food is miscellaneous. I saw it eat a frog, and a vegetable that looks like a cabbage. Its teeth are in the shape of saw-teeth, but not as thin as that. The hind ones are broad on top, for grinding.

"It can hold very well with its fore-feet and claws. I saw it hold a frog with one, and a cabbage-plant with the other, and eat, first one, and then the other. It hardly seems to be a reptile, going round in this way. It really seems like a mammal; but it has no teats (2).

"They walk round in the water the same way, nearly up to the neck. On the land, they look like great bull-frogs as they go hopping round. It is taller than I am when it stands up, — a foot higher than my head." (That would be six feet eight inches.)

"I do not see them swim at all; though I see three or four wading.

"They make curious tracks as they go along on the mud, — two big ones, and two little ones, — when they are after the frogs; but at other times they hop three or four times without touching the fore-feet, and just make the two large tracks, till they rest; when they always put the fore-feet down before they sit up.

"I notice that the small toe on the hind-feet does not make an impression unless the mud is very soft. It is like the spur of a rooster. The reptiles have been squatting down here; and I see the impression of the leg as far as the knee-joint (3).

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"They are not mammals; for I see a nest, with a little one just coming out. At the edge of the hole I can see some egg-shells. It is standing on top of the nest, which is about five feet high, and looks like a muskrat's nest.

"They are just hatching out. Every one makes a hole for itself. Another has just broken out. They are very lively, and seem to know just what to do. What little bits of tracks they make! They are hopping round now. The eggs are about as large as ostrich-eggs, but rougher on the outside, and nearly round. The shell is soft, like the shell of a turtle's egg, but has little round pimples all over it. The inside shows slightly through the shell, and that gives it a yellowish look.

"As soon as the young ones hatch out, they eat some part of the egg that is left. It looks like the white of a hen's egg. The old ones pay no attention to them. They go down to the water as soon as they get out and get fairly to going. Their teeth are almost as sharp as needles.

"I see a whole drove of these little fellows. They keep together. They make a squealing noise all the time."

THE PTERODACTYLS OF THE CONNECTICUT VALLEY.

"I see some kind of a reptile that comes down and tears open these nests, and sucks the eggs. It is a great bat-like reptile. I believe it is a pterodactyl. It sticks its wing-claws in the ground, and crawls along like a bat. It has a well-shaped hind-foot, which is like the leg of a lizard.

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"It is all covered over, tail and back, with scales (4) that are wide apart. They do not overlap. It is of a slate-color. The scales are nearly white, and almost square, — a little longer one way than the other. It is about as large as a bald-headed eagle. They look like great bats flying around (5). (Draws Fig. 68.)

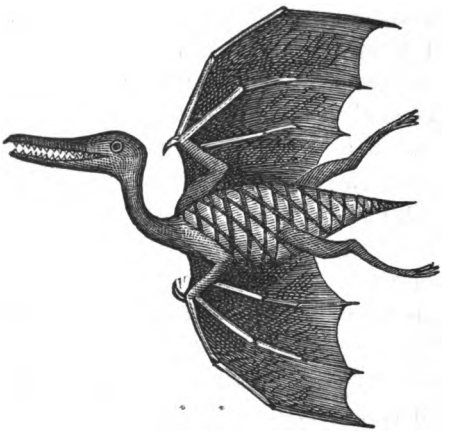

FIG. 68. — Bat-winged pterodactyl.

"They seem like regular devils, going round eating every thing, — not only eggs, but young ones. They dare not attack the large ones. The poor frogs have to catch it! They are large and conspicuous." ("How large?") "About eight inches long. They get on the rocks in the river, and the pterodactyls go for them. They dive into the water, and the leaping reptiles seize them. These kangaroo-reptiles are very active. I see one scratching its head with its hind-leg.

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"There are several kinds of them. One has a beard round its jaw, of stiff, coarse hair, two or three inches long. It would prick your hand, it is so stiff.

"I see now the skeleton of a very long-necked animal, like a plesiosaurus, stretched on the sand. It is about twenty feet long. The head is lizard-like, with conical teeth. I see the paddles" (6).

(1.) As soon as the animal was drawn, I was struck with its resemblance to what Prof. Cope calls *Lœlaps aquilunguis*, a large kangaroo-reptile found in the marl-pits of New Jersey, a restoration of which is contained in "The American Naturalist" for April, 1869. I do not think that Sherman had ever seen this; but I am not sure. There must have been a great resemblance between the *lœlaps* of New Jersey and the kangaroo-reptile of the Connecticut valley. Of the New-Jersey reptile, Prof. Cope informs us that its bones are light and hollow; and that it probably walked on the entire sole of the foot, like a bear. The fore-limbs were not more than one-third the length of the hind-limbs, which could not have been less than six feet eight inches in length. "Fragments of the jaws indicate a face of very considerable length, showing shining, saw-edged, knife-shaped teeth." Prof. Cope says, we can "imagine our monster carrying his eighteen feet of length on a leap at least thirty feet through the air, with hind-feet ready to strike his prey with fatal grasp, and his enormous weight to press it to the earth." What is remarkable, he adds to the description of this and other allied forms the statement, that their existence

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"would amply account for the well-known foot-tracks of the triassic red sandstone of the Connecticut valley." *

The kangaroo-reptile was not, however, much more than one-third the size of the *lælaps*.

(2.) It was probably warm-blooded, and therefore much more active than our modern reptiles.

(3.) I have examined many of the tracks found in the valley of the Connecticut River, but have seen none that exactly correspond with those that would have been made by this animal. The tracks attributed by Dr. Hitchcock to *Anomœpus* approach nearest to it. Fig. 69, from "The Popular-Science

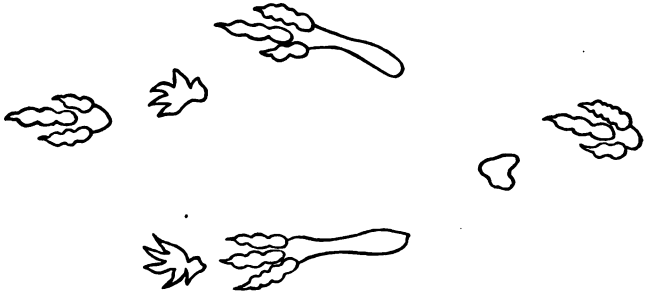

FIG. 69.—Tracks of Anomœpus.

Monthly," represents a portion of a slab, on which the track, exactly resembling that of a three-toed bird, suddenly changes, in consequence of the animal resting, to the track of a tailed quadruped; its long heel resting on the ground, and its tail making an impression.

* American Naturalist, vol. i. p. 23.

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I think it probable that the kangaroo-reptile walked at times upon its hind-feet, as well as hopped; though Sherman does not appear to have noticed it.

(4.) Cuvier taught that the pterodactyl had scales; and he was probably correct with regard to some species.

(5.) This pterodactyl differs from all that have hitherto been discovered, in having all the digits of the anterior limbs attached to the wings, as in bats, instead of merely the fifth digit, as may be seen in all previous representations of the pterodactyl. No tracks have yet been found in the Connecticut valley that indicate the existence of the pterodactyl at the time its sandstones were deposited: but we may confidently expect them to be discovered; for they appear to have been very numerous.

The oldest known remains of the pterodactyl are from the lower lias of Wurtemberg; and I think it will be found that the sandstones of the Connecticut valley are as young at least as this, the probability being that the upper beds are considerably younger.

Fig. 70 was sketched by Sherman some time after the examination, and gives, with very little change, the scene just as he observed it and was able to delineate it.

(6.) This he subsequently saw alive. The plesiosaurus has been found in beds which range from the lias to the chalk inclusive; and it is not, therefore, surprising that it should be in the Connecticut valley, if we consider the time to have been as recent as the lias.

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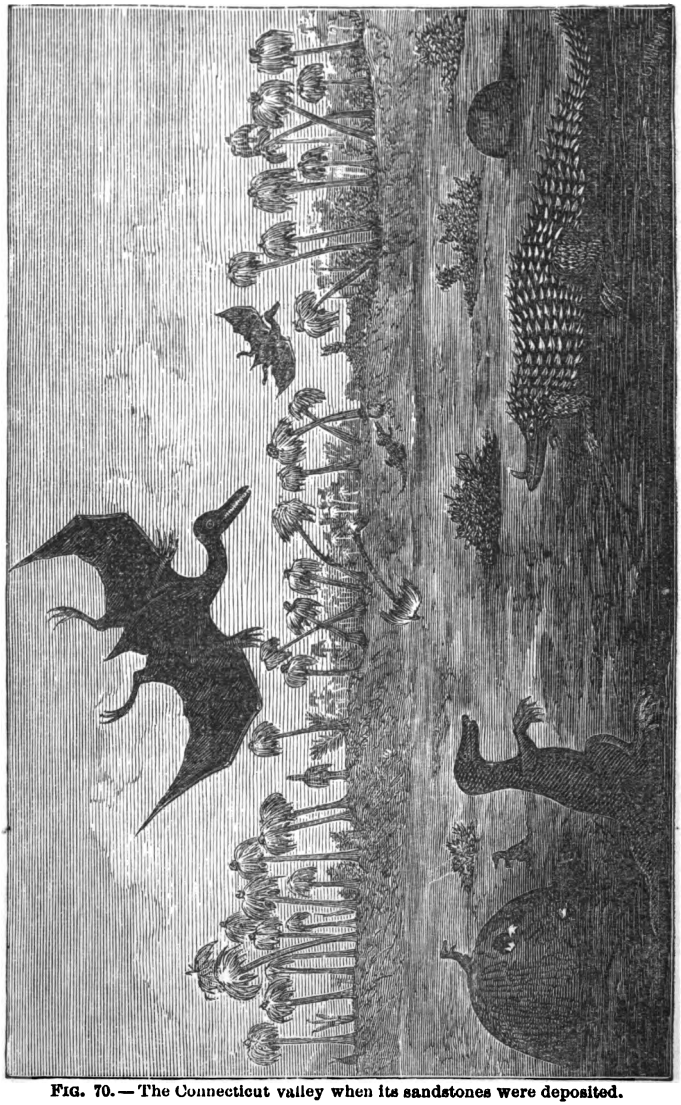

FIG. 70. — The Connecticut valley when its sandstones were deposited.

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PTERODACTYLS IN THE CONNECTICUT VALLEY.

On the following day the examination was continued.

"I seem to be in exactly the same place as before. I see a number of those nests, and as many as a dozen pterodactyls; some flying. Some are hanging on the bushes by their hooks. I fancy some are nocturnal (1). One has a spread of as much as four feet from tip to tip. I see some little ones almost exactly like a bat. Their jaws are short."

("How do they move?") "They stick their claws into the ground, and then move their hind-feet along (2). It is easy for them to hang, — no effort at all.

"The large ones fly after the little ones, and eat them.

"They are not mammals, as I supposed: they are reptiles; though some of them are quite hairy."

I asked him to find a nest, and describe their eggs; but he exclaimed, "Oh! I see a monstrous one now. It even attacks the kangaroo-reptiles, and takes them right up. Its body is seven feet long (3). When its wings are spread out, and I look at them edgewise, I see them get thinner as they go out from the body, till they look no thicker than a sheet of paper. In this one, the last finger, that should be the little finger, is long; and the wing extends from that like the pterodactyls of the books. This does not rest on the trees. It takes animals up, shakes them, and then comes down with them on the ground, and eats, holding them with the fingers of its fore-feet. It lights awkwardly, fluttering for some time.

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"The wings are very much hollowed when spread out like an eagle's wings.

"It goes round quite slowly after eating. It is too heavy to hang on a tree. I think it is preposterous to represent one of these catching a spindle (4).

"I see another kind of kangaroo-reptile, very much like the other; only its feet have long claws on like a bird's.

"It is difficult for the pterodactyl to rise. It is like a man on stilts who has fallen down. Its wings are so long, that it has to lift its fore-feet up a long way to get them clear of the ground. This large one is the terror of every thing. It goes down into the water, and can fly up from the water a great deal easier than from land. It can dive like a kingfisher. There are quite stout bristles on it, on the web between the fore-legs and shoulders, and across the back. Its neck is very long, like a crane's neck. It has no scales, nor have any that I have seen to-day."

THE HORNED REPTILE.

"I see some very large reptiles on a hill away off the river where the ground is bare. Their tails are immensely long. The reptiles are very sluggish. They have horns all over their body, and one on their nose (5). (See Fig. 70.)

"It is all sandy here; and it digs into the bank, and gets up bulbs that grow at the root of a palm-like tree. Some of them are three feet through: they are like the bulb at the root of an onion, and have roots extending from them in every direction. The reptiles root round, and kill many of the trees. They seem

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to be water-reptiles; but all I see are on land. (Draws the tree, Fig. 71.) It has a good many curls

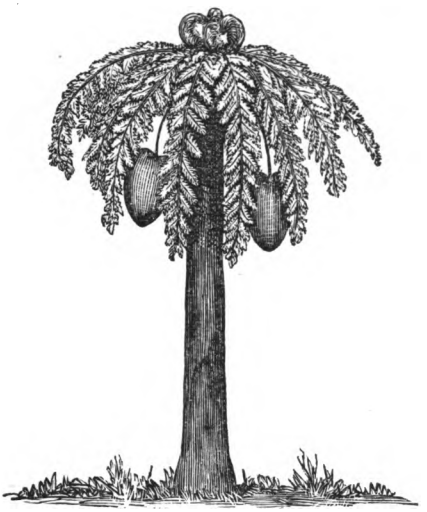

FIG. 71. — Bulbous-rooted tree.

on top, like a fern. There are some large fruits on the tree, nearly black. They look as if they were good to eat. I saw one that had been eaten into; and it was blood-red inside, like some peaches."

(1.) This he subsequently found to be the case. Cuvier supposed, from the magnitude of their eyes, that they were nocturnal; but it is probable that this was only the case with the smaller bat-winged pterodactyls.

(2.) Prof. Owen, from the anatomy of the pterodactyl, had come to the conclusion that it must have moved upon the ground in this way. He says, "The pelvis is weak, and the hind-limbs bespeak a creature

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unable to stand and walk like a bird. The body must have been dragged along the ground like that of a bat." *

(3.) The remains of pterodactyls have been found in the cretaceous rocks of England, which indicate an expanse of wing of not less than twenty-seven feet.

(4.) He refers to engravings of the pterodactyl, in which it is represented as chasing a dragon-fly.

(5.) This, in its general appearance, resembles the crocodile more nearly than any other existing reptile.

STRANGE REPTILES OF THE CONNECTICUT VALLEY.

A few days afterward, I powdered the last specimen, so that it might not be recognized; and this was examined as before.

"I am on the side of a river, — quite a large river. In it is a water-lizard about two feet long, smooth, and of a brown color. It has five toes on the fore-feet, and four on the hind-feet; and they are webbed (1).

"I see another of those large birds, exactly like the one I drew last Saturday. It is walking on the bank of the river. It is not like the place I saw before. There are no ponds here. (Made some slight changes in the figure of the bird previously drawn.)

"I see another pterodactyl, one of those big ones, flying round, and almost exactly what I saw before, — one of those bulb-eating reptiles at the root of one of those trees, — and a kangaroo-reptile jumping along.

"How those birds can run when they want to, and take long strides! The pterodactyls do not seem to trouble them.

* Owen's Paleontology, p. 272.

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"I see numbers of reptiles now, walking about on the muddy shore. I cannot understand why I did not see them before. Those bulb-eaters eat animals also: I see them eating young kangaroo-reptiles."

THE PENGUIN-REPTILE.

"I see a strange animal now. I think it must be a reptile. (Draws Fig. 72.) It is between two and

FIG. 72. — Penguin-reptile.

three feet tall. It has a smooth skin, and is nearly black. It has a penguin look. The fore-arms are flippers, such as a seal or a walrus has (2). The hind-feet are webbed, and have three toes. It has sharp teeth, like those of a pike. It walks on its hind-feet alone, very slowly; takes short steps; and is all the time assisted by its tail (3).

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"It is about as ravenous in the water as the pterodactyl is on land. It attacks fishes, frogs, and every thing it can. It swims strangely: it makes flippers, hind-feet, and tail, all go, but swims principally by its flippers.

"Here is a dead fish with a curious kind of fin right behind the gill.

"Now I see a kind of hump-backed animal, — a curious reptile, very large; I think, as much as thirty feet long. It is in the water, and is a good deal like an ichthyosaurus, but has feet instead of paddles. The teeth are large and conical; and the feet are like frog's feet. (Draws. Fig. 73.)

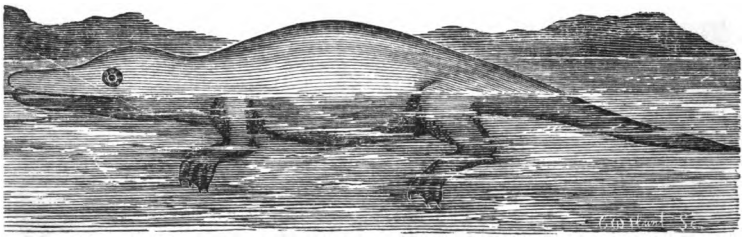

FIG. 73.— Great reptile.

"The penguin-reptile tries to bite it; but the skin is too tough for it to make an impression. It seems to care nothing about it.

"This great reptile actually catches the pterodactyls. It stays under water; and, when they come down to fish, it snaps them, and down they go. It turns them round to get them the right way to swallow.

"Here is a long-necked reptile too, like a plesiosaurus. (Draws Fig. 74.) It ate up a young one of these large reptiles.

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(1.) The *apatichnus* of Hitchcock is about such a track as this animal would have made, except that, in the track, there are no indications of a web.

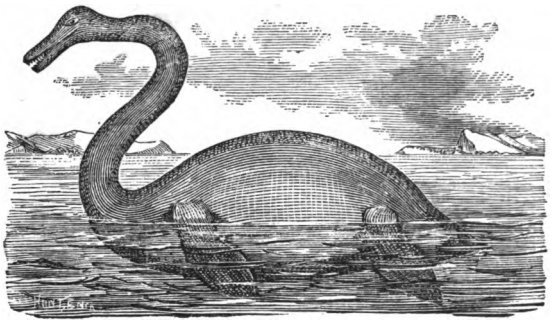

FIG. 74. — Swan-necked reptile.

(2.) In answer to questions at the close of the examination, he stated that there were inside of the flipper a number of bony rays, so that it resembled the fin of a fish more than the fore-limbs of a seal; and the animal seems to have been a compound of reptile, bird, and fish, — one of those comprehensive types of which we have so many examples among the old-life forms.

(3.) There are tracks on the Connecticut-valley sandstones that appear to have been made by somewhat similar forms, only much larger.

The number of animals intermediate in form between reptiles and birds must have been very great. Psychometers have certainly described to me more than twenty different kinds, forming steps in the ladder of life that connected these two, at present, widely-differing classes.

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Ages.	Periods.	Groups and Rocks.
Age of Man.	Quaternary.	Vegetable soil. *Alluvial.* — Clay, sand, and gravel. *Drift.* — Clay, gravel, and bowlders.
Age of Mammals.	Tertiary.	*Pliocene.* — Sands, clays, and marls. *Miocene.* — Marls, limestones, &c. *Eocene.* — Clays, sandstones, &c.
Age of Reptiles.	Secondary. Cretaceous.	*Chalk.* — Flint, greensand, and limestones. *Wealden.*
	Secondary. Oölitic.	*Oölite.* — Shales and limestone. *Lias.* — Shales. *Trias.* — Red sandstones and saliferous marls.
Age of Plants.	Permian.	Magnesian limestones and red stones. Shales.
	Carboniferous.	*Coal-Measures.* Alternating sandstones, shales, and coal-beds. *Cavernal Limestone.* Conglomerate.
Age of Fishes.	Devonian.	*Old Red Sandstone.* *Chemung.* — Shales. *Hamilton.* — Shales. *Corniferous.* — Limestones. *Oriskany Sandstone.*
Age of Mollusks.	Silurian.	*Lower Helderberg.* *Saliferous.* — Marls. *Niagara.* *Oneida.* *Hudson.* *Trenton Limestone.* *Potsdam Sandstone.*
Age of Radiates	Laurent'n Cambrian.	Crystallized limestones, gneiss, and quartzite.
Age of Minerals.	Metamorphic	Clay-slate, mica-schist, gneiss.
	Granitic	Granite.

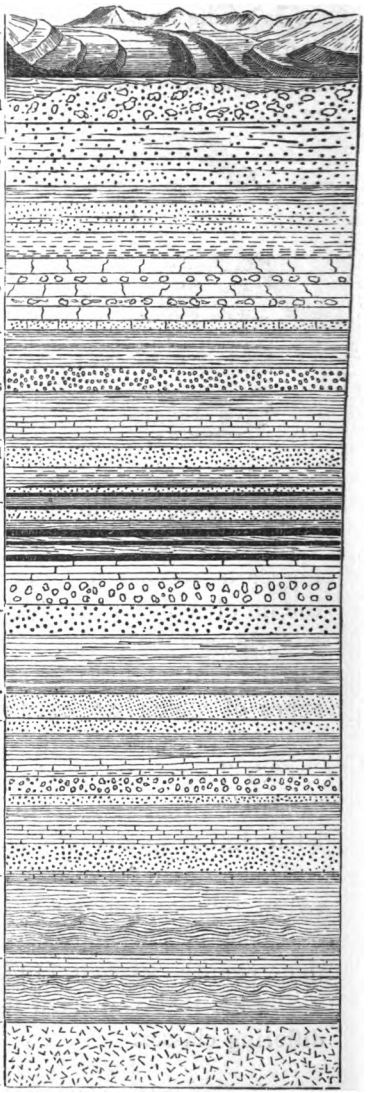

Fig. 75. — Chart of formations.

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A MAMMOTH FROG.

JULY 3, 1873.

Part of a large slab, powdered, from Smith's Ferry.

"This is, I think, something from the Connecticut valley; for I see some of the same kind of animals — kangaroo-reptiles and penguin-reptiles — along the side of the river; a very large pterodactyl too: I should think it is twenty-five feet from tip to tip. It is flying."

"I see one large animal that looks something like a frog, but is as large as a good-sized cow. (Draws Fig. 76.) It has webbed feet, and the web is very thick

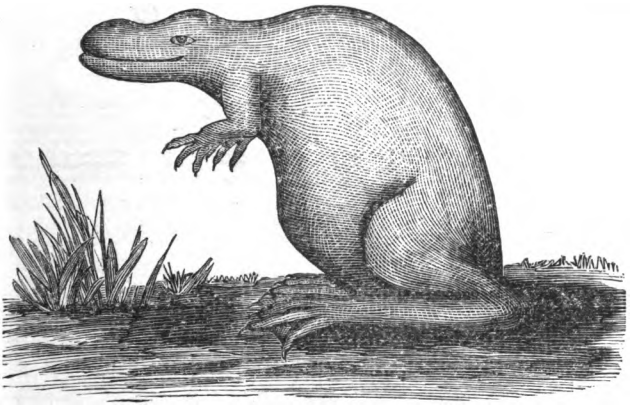

FIG. 76. — Mammoth frog.

and tough. It has five toes on the fore-feet, and four on the hind-feet. The hind-feet are very much larger than the fore-feet. The skin is bare, and spotted green and brown. It walks, and sometimes hops. Sometimes it walks on its hind-feet, and sometimes it uses all four (1). It has no tail. Its teeth are long and conical: they stand two inches above the gum.

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"When it comes down on its fore-feet, its belly makes a deep hollow in the mud, and you can see the foot-marks all round that.

"It leaps on reptiles larger than itself, and kills them. I saw it kill one of those bulb-eating reptiles. It plays with it after it is dead, somewhat as a cat does with a mouse, — lifts it up, shakes it some, and leaps upon it. I should like to see the slab with these tracks on: there are about forty or fifty all round here.

"A very large beetle is crawling around here. It is a carrion-beetle, and three or four inches long. (Draws

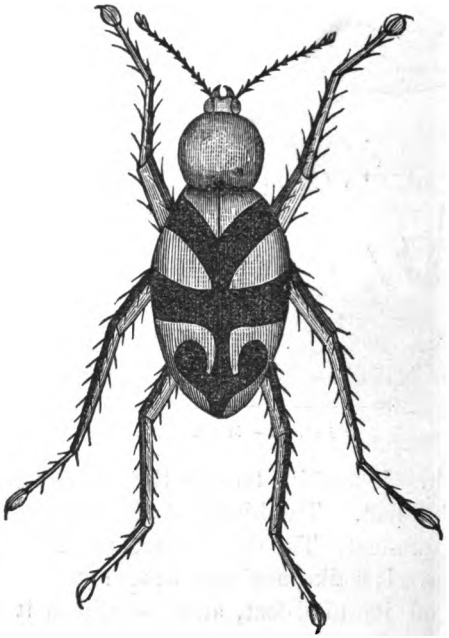

FIG. 77. — Ancient carrion-beetle.

Fig. 77.) It is red and black, — the same color as a carrion-beetle, but marked differently.

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"Oh! but I see some pretty butterflies by the side of a puddle near the river. They are quite small, — about two inches across, — but very beautiful." (Draws Fig. 78.)

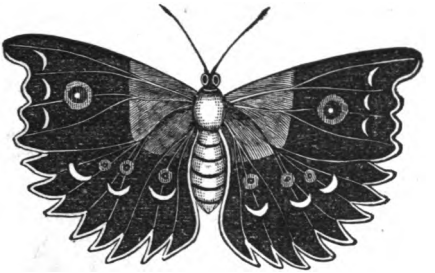

FIG. 78. — Crescent-winged butterfly.

("What color is it?") "The main portion is a dark blue; the central dot is white, the space round it nearly green; the rest of the wing a light blue, except the crescents, which are silver-white. The small wings are pink, with a white margin round both wings.

"The males are the most beautiful. In the female the colors are quite pale. They are about as hairy as moths.

"When that great frog jumps, it makes tracks a foot deep in places. No one would suppose them to be tracks. They fill up with water.

"I see another butterfly flying. It is all white but two large pink spots on each wing. Oh, I see! it is a moth.

"I see another of those large frogs: it is larger than the first. What a tremendous mouth it has! I can easily reach to the top of its head when it is sitting. The eyes are not very large for the size of the animal, and they are not on the top of the head.

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"I see a great many narrow-toed tracks, such as I saw last night, — one long middle toe, and two short ones; but I see no animal that makes them.

"Those small butterflies are very common: they are in swarms around the puddles.

"Oh! I see a very long-nosed, kangaroo-reptile. It has an extremely long nose. (Draws Fig. 79.) The

FIG. 79. — Long-nosed kangaroo-reptile.

under-jaw is not long at all. It is eating grass. It has five toes on the fore-feet, and four on the hind-feet. It has to bite at the grass sideways.

"When another one came up, it jumped at it, and struck it with the nose, which is quite hard, as a woodpecker does with its bill.

"While that one peacefully nibbles grass, I see another one eating some kind of large eggs, which it digs up with its nose and fore-feet. It draws the earth towards it. The eggs are very large, — as much as five

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inches through, — and clear and soft. There are a great many of them in a great heap of dirt. It punches them with its nose: they are tough. I see a small lizard in the middle, like a crocodile: it may be a young bulb-eater. Some of the eggs are so tough, it cannot get them open."

(1.) Tracks of what is believed to have been an enormous frog have been found in the Connecticut valley. The hind-feet were about twenty inches long, were webbed, and covered about a square foot of surface; but the track of the *otozoum*, as Hitchcock has named it, does not agree, except in the number of the toes, with the feet of the animal represented. It is probable that there were many huge batrachians, and reptiles between batrachians and lizards, in the Connecticut valley, at that time.

WALKING-FISH.

JULY 5, 1873.

Portion of a slab from Turner's Falls, Mass. Sherman knew that it was a Connecticut-valley specimen.

"I seem to be away from the river, on a bank; but I can see the river, and I see an elk." ("Go farther back.")

"I am in a different place, near the water; and I see a great many fish, none very large.

"I see as many as a thousand very small frogs, not an inch long, yellow and black. I think they are full-grown. They are all the same size and the same color. They are hopping round near the water. They have five toes on the fore feet, and four on the hind.

"I see a strange-looking animal. It has four small

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feet." ("What color is it?") "It is nearly black. The head looks considerably like a frog's. I fancy it has been injured. It seems to be a female. I see a male — jet-black, shiny-black — with the same kind of marks. The skin is bare. It has a very large mouth. (Draws Fig. 80.) The teeth seem as if they were made for

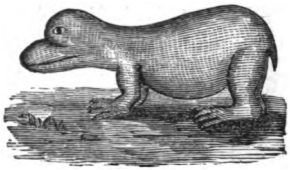

FIG. 80. — Short-tailed reptile.

crushing shells. The hind-feet are much longer than the fore-feet. (Draws Fig. 81.) That is the track.

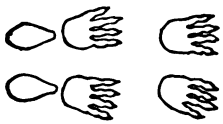

FIG. 81. — Track of short-tailed reptile.

"It is a plant-eater. It feeds on the tender curls of the ferns. It is about as large as a rat, and has an ear just like a frog's ear, — a little brown spot." ("Is it a mammal?") "I do not think it is: it has no teats.

"Well, here are some curious tracks; made by a

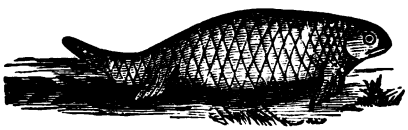

FIG. 82. — Walking-fish.

walking-fish, I should think. I see the fish making them. I will draw the tracks. (Draws Fig. 82.)

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They are made by the fins. It is very scaly, and about a foot long. The fins are notched. It is as much as fifty feet from the water, and walks as fast as a turtle of the same size (1).

"I see kangaroo-reptiles and bulb-eaters.

"It can only move the fore-fins: the hind ones are stiff, and don't touch the ground. Its belly drags along. It goes into the river, and then comes out again, and into puddles. It does not like to stay out long. When its back gets dry, it goes into the water again.

"I see as many as five hundred in one place, travelling about. Some lose their balance and fall over, but get up again. When they put down their fins to push, it lifts them up, and they look a little like toads hopping. It is of a brownish color; but there is a kind of metallic blue when the light shines on it in a certain way.

"Now I see a very curious track made by a crustacean. (There are a great many small animals.) This is five or six inches long. The marks are made by the claws. (Draws Fig. 83.) It is of a slaty color. Its

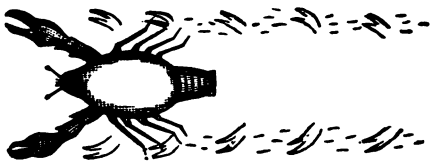

FIG. 83. — Crustacean and track.

tail is so small, that it does not drag at all. It walks a good deal like a beetle (2).

"I see a butterfly, that looks, on the edge of the wing, like the outline of a man's face. It is about six inches

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across. (Draws Fig. 84.) It is pink, black, and a very little red on top, and dark underneath. There

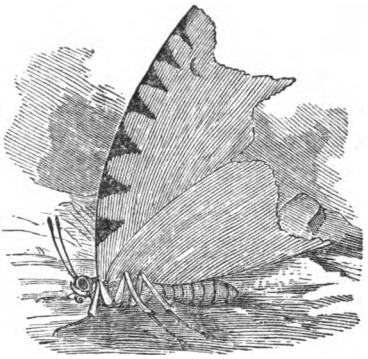

FIG. 84. — Profile-butterfly.

is a spot that answers for an eye. Where it is black on the under side, it is red on the upper.

"A very long-legged insect is laying its eggs here. It looks like a crane-fly, and is about six inches long. It is a great daddy-long-legs. Its track is very fine.

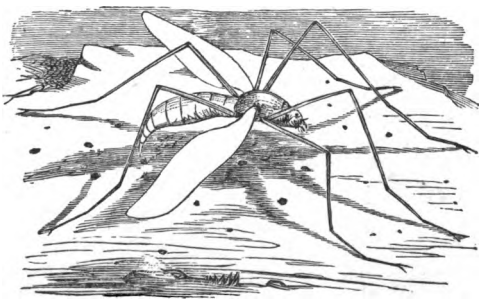

FIG. 85. — Ancient crane-fly.

It keeps bobbing down, punching holes in the mud, and laying its eggs" (3). (Draws Fig. 85.)

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(1.) Living fishes of the families Lophiodæ and Siluridæ have the ability to travel on land. Dr. Hancock, speaking of the *flat-head hassar*, says, "It possesses the singular property of deserting the water, and travelling overland. . . . When the water is leaving the pool in which they commonly reside, . . . they simultaneously quit the place, and march overland in search of water, travelling for a whole night, as is asserted by the Indians, in search of their object. . . . They project themselves forward on their bony arms by the elastic spring of the tail exerted sideways. Their progress is nearly as fast as a man will leisurely walk." *

Dr. Hitchcock regards some of the tracks on the Connecticut-valley sandstones as the tracks of fishes; but there are none of them that resemble those of Fig. 82.

(2.) The tracks represented by Fig. 83 very much resemble those on a sandstone slab found at Turner's Falls, and figured on Plate 51, Fig. 4, in the "Ichnology of Massachusetts," by Dr. Hitchcock, and are represented by him as the tracks of a crustacean.

How a crustacean like this could make such tracks, it is difficult to see. It would appear that the large claws were stuck in the mud, and the body pulled along; while the smaller feet moved lightly on the surface, leaving but little evidence of their existence.

(3.) It seems to have resembled our common daddy-long-legs both in appearance and habits.

* Penny Cyclopædia, art. "Siluridæ."

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MORE STRANGE ANIMALS.

JULY 8, 1873.

Specimen from near Smith's Ferry.

"I see a large bird like the last I drew, but smaller. It is, perhaps, a young one. It is walking along on the mud near the river. There is a strip here, only about two hundred feet broad, that is covered with mud.

"It is a very dark, cloudy day. I see many of those bulbous-rooted trees, with fruit on them. This bird goes along like a great Shanghai, digging into the mud with its bill." (Turned the specimen over.)

"I see a pair now in the same place, and of the same size. This may be a smaller species. These birds are troubled with a large kind of lice: I see them on their feathers. (Draws Fig. 86.) They are

FIG. 86.—Flying bird-louse.

very flat, of a yellow color, and about as large as my thumb-nail. They have the most singular legs I ever saw; and they have wings (1). When the bird shakes itself, they fly off; but, just as soon as it is still, fly back again, and run under the feathers.

"I see a kind of beetle on the mud, with a very long proboscis, with pincers on the end of it. (Draws

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Fig. 87.) It is about an inch long; perhaps a little more. It is a shiny black.

FIG. 87.—Proboscis-beetle.

"I think it would puzzle any one to tell what made these tracks. (Draws Fig. 88.) It is a worm with

FIG. 88.—Spiny-tailed worm.

a spiny sort of tail. It is about two inches long, and of a green color. Underneath it has rows of ridges, two to each joint; except the first, which has three.

"A dead dragon-fly is spread out on the mud. It is six inches across. It looks as if it would fossilize nicely. The body and head are green, and the wings transparent.

"They have big showers here. There is one now that seems as if it would wash every thing away. This muddy place seems to get larger every rain. There is a bank of earth, back from here, that washes down where the river rises, and increases the flat.

"The birds make for the bank when the shower comes. How they straddle!

"Well, I declare! I see a mammal that looks very

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much like a rat. It is hairy; has a long, file-like tail, and sharp front-teeth, like a rodent." ("Is it marsupial?") "No. It makes rather curious tracks, — roundish marks, not a bit like its foot (2). (Draws Fig. 89.) It is about the same size as a good-sized

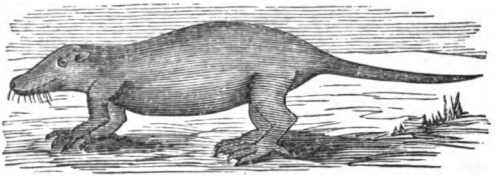

FIG. 89. — Ancient mammal.

rat, and the same color; and has five toes on each foot.

"I see a strange head of some animal. The mouth is all covered with perfectly flat teeth, — tongue and all. The head is a foot long, and the mouth is wide open. It must be some large fish.

"There is a very small and long snake — about eighteen inches long — on the mud. It is no larger round than my little finger at the end. It is dark-colored, with black spots."

(1.) The legs are much like those of some modern bird-lice; but these ancient parasites differed, it appears, from all the modern ones, in their possession of wings.

(2.) There are tracks on the Connecticut sandstones something like those he drew, and supposed by Dr. Hitchcock to have been made by some mammal. The remains of marsupial mammals have been found as low as the trias; and it is not unlikely that there should have been, at this period, mammals still higher in the scale.

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THE TRACKS OF A PTERODACTYL.

AUG. 7, 1873.

"I think I am somewhere in the Connecticut valley; for I see one of those large birds I drew last.

"I see about as curious a track as I ever saw. It is, perhaps, six inches long. It is uneven (1). (Draws Fig. 90.) They go in pairs, a good distance apart.

FIG. 90. — Curious track.

"I think this animal would be difficult to restore, from its track. It is, I think, a little pterodactyl, that struck its wings when it went to rise, and made these impressions (2). (Draws Fig. 91.) The longest tracks would measure about a foot.

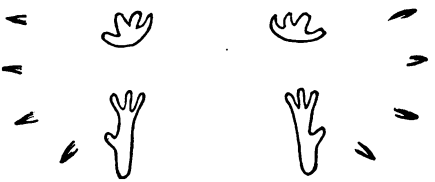

FIG. 91. — Supposed track of a pterodactyl.

"There are some trees on this level place by the side of the river that are different from what I have seen before. (Draws Fig. 92.) Some of the leaves are crooked. It is only about ten feet high. I see a handsome little butterfly about two inches across. The upper wings are yellow, edged with dark brown;

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and the lower wings are yellow, with silver crescents." (Draws Fig. 93.)

FIG. 92. — Crooked-leafed tree.

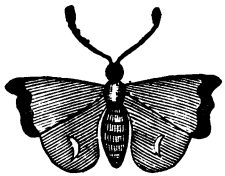

FIG. 93. — Handsome little butterfly.

("Go down the river.") "I think there are just as curious animals away from the water; only they did not make tracks. I see some. (Draws Fig. 94.) It is

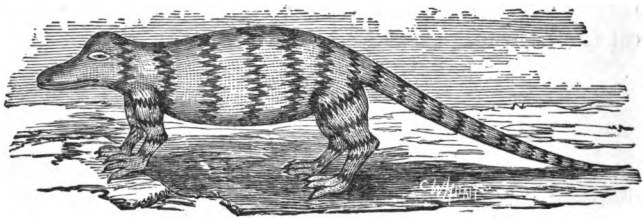

FIG. 64. — The Banded reptile.

a sleepy-looking animal, about as large as a cat. It is singular, that, except butterflies, nearly all those ancient animals are deficient in color. This is better than some. It has brown zigzag marks; and the rest is a dirty white. It goes by jumps. The skin is quite smooth. It burrows in the ground. There are several pterodactyls here. They go in company like many birds.

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"I see a strange thing now. I do not know what to call it. (Draws Fig. 95.) It blows up, and then

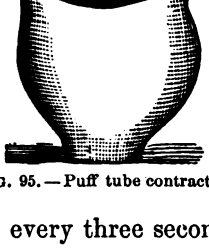

FIG. 95. — Puff tube contracted.

sinks down, about every three seconds, regularly. It has a little hole at the top; and I can just see something fine coming out. When it is puffed up, it is black at the top, on the outside, and the rest brown; but, when it sinks, the black part is the inside of the cup. When it rises to the top, it gives a gentle puff. I see some others round here doing the same thing. There are some old, dead ones. All that grow round here keep time. When one is up, they are all up.

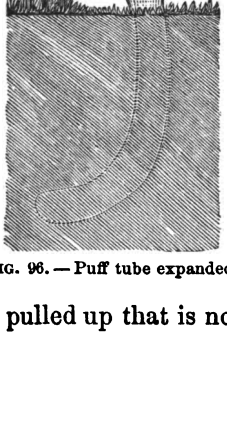

FIG. 96. — Puff tube expanded.

"Now I see one pulled up that is not going. (Draws

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Fig. 96.) It has not roots: there is only a black tube. It is just a hollow shell, with no hole at the end that is in the ground.

"There is something inside that moves as the outside moves. It is filled with some kind of substance."

(In answer to questions.) "It is about four inches high. The shell is hard as a snail's; but the top is like thin rubber.

"I think it is an animal. I see one that is a cup at the top, and has something on top that it seems to be taking in. The hole enlarges, so that it goes in."

(In answer to questions.) "It is mountainous round here, and mostly covered with ferns and large-leaved trees such as I just drew."

A METEORIC SHOWER.

"I see a great meteoric shower in the day-time. The stones strike the trees. One set the grass on fire when it fell: sparks flew off in every direction. The meteors are coming down very fast. I do not hear many explosions. They come down obliquely, and from the south. I see a magnificent one that must weigh more than a ton. The hot air from it scorches the leaves over it. As the lower leaves fall, the upper ones are scorched, and droop. This large meteor rolled along the ground when it fell. They are falling now as thick as sparks from a Roman candle when it bursts. I saw one, as large as a man's head, strike on the side of a hill, and go out of sight.

"Some of them were so hot, they flattened out when they fell" (3).

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(1.) This is different from any thing that I have seen from the Connecticut valley. It appears to me to indicate a bird-like reptile, whose general mode of progression was by hopping.

(2.) It is difficult to see how any pterodactyl with which we are acquainted could make such wing impressions as those.

(3.) It is quite probable that meteoric showers were much more common in the world's younger days. The iron, of which they are mostly composed, would oxidize after reaching the earth; so that we have but little chance to find these ancient meteorites.

A NIGHT-VISIT TO THE CONNECTICUT VALLEY IN THE LONG-AGO.

AUG. 12, 1873.

The examination was continued on the next day.

"I hardly know where I am. It is night, and this is a strange-looking place. The moon is just rising over some mountains about ten miles off, I think." ("Are they high?") "Yes: quite high. It is a hideous place at night. The noises are horrible. I hear what sounds like a bull-frog's croak magnified a thousand times. I see one of those dodo-like birds that I saw last night (1). (The moon is nearly full.) It is walking along on the side of a stream.

"I see a quite handsome flower: I think it must bloom in the night. (Draws Fig. 97.) There are bunches of them on what look like flags. I think the flower must be blue. The plant is about six feet high.

"There are a great many insects, for I hear them

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buzzing and humming; some of them beetles, by the sound.

FIG. 97. — Night-blooming flower.

"I see a very curious phosphorescent worm, or glow-worm. (Draws Fig. 98.) It is about two inches

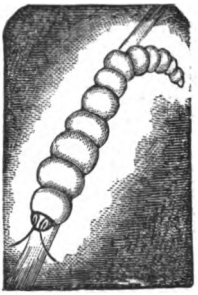

FIG. 98. — Ancient glow-worm.

long. It is head downward on a stalk of that plant. The light radiates from the back, so that you can see the whole body (2). The light makes the worm look green. It seems to come from the inside; so that you can see into it.

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"Small pterodactyls of the bat-wing kind are flying about (3).

"It is the kangaroo-reptile that makes such a terrible noise." ("Which kind?") "The first kind: the others, I think, are rare.

"I see a large kind of fire-fly. The shape is about all that I can see. It seems to be of quite a different kind from our fire-fly (4). (Draws Fig. 99.) It lifts

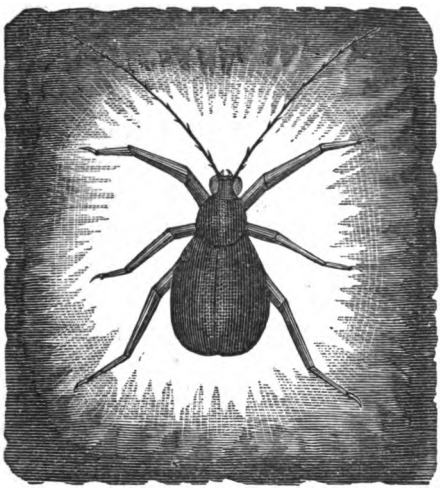

FIG. 99. — Luminous beetle.

its wings when it is giving the light. It seems to come from the back. It is not luminous when it is flying.

"There seem to be about as many animals in motion by night as by day. Three long, slim snakes are crawling along on this flat by the river.

"There is a very bright star just above the moon:

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it seems to be white. I do not think I ever saw it before. It is much brighter than any star we have now. It gives so much light, that every thing has a double shadow (5).

"I see another shower of shooting-stars a great way off. I think they must have been common then. They are pouring down; and all seem to come from one place, and not from a very great height.

"Now it is day, and I am in a different place. I see where lava has run down, and made a place like the Giants' Causeway (6). The river runs close to the columns."

(1.) In an examination which is unrecorded.

(2.) Although the light of the glow-worm proceeds from the under-side of the abdomen, it is so vivid as to shine through at the junction of the segments on the back. Two species of centipedes give light, at night, from the whole body.

(3.) This smaller species of pterodactyl may have fed upon insects.

(4.) At least seventy species of luminous beetles are known which are natives of the hot and temperate regions of America.*

(5.) This may have been a comet, or a star, such as have been known to blaze up for a time with great brilliancy.

(6.) There are bodies of trap in the Connecticut valley, to-day, that have a columnar structure; and many may have existed, and the action of the river swept them away.

* Kirby and Spence's Entomology, p. 506.

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COAST OF THE UNITED STATES WHEN THE SANDSTONES OF THE CONNECTICUT VALLEY WERE FORMED.

A few days after the last examination, Sherman made another with the powdered specimen from Smith's Ferry; when I said, "Go down the river." After a description of the country and some of its animals and plants, which I should give if I could afford more space to these examinations, he said, "I have come to a place where there are falls, about ten miles below. There are rocks on each side, eight or ten feet high, that the river has cut through.

"I have come to the sea now. There is a large bay before I come to the open sea. It is quite inland; but the water is salt." He then drew a sketch of the river, bay, and coast; but, finding the book too small to continue on the scale with which he commenced, he drew a second on a large sheet of paper. The following (Fig. 100) was carefully drawn from these two, giving as accurately as possible the outlines drawn by him.

Although he knew nothing of the disposition of the rocks in the United States called the new red sandstone, and could not possibly have known any thing of the geography of the country at the time the rocks were laid down, yet it will be seen, by those familiar with the subject, that the map, although rude, indicates a familiarity with the then-existing coast. What is now the coast of New Jersey is represented as stretching much farther into the Atlantic Ocean; and I find, although I did not know it at the time, that this had been previously conjectured by those familiar with the geology

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of the region. Dana says, referring to this locality,

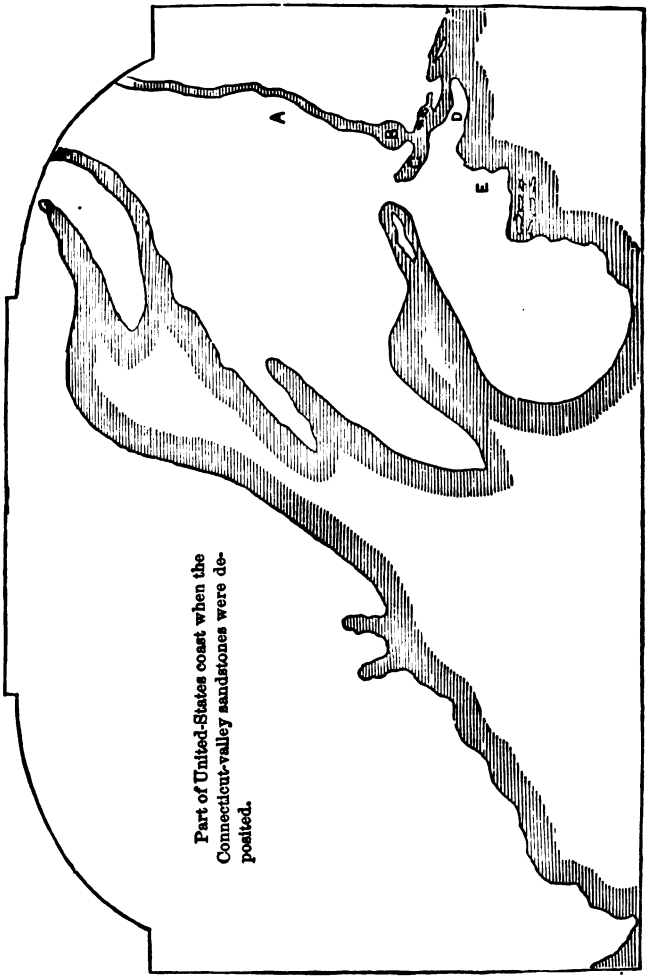

FIG. 100. — A, Connecticut River. B, "the Bay." C, Gulf where Long-Island Sound is. D, Land where Long Island now is. E, New Jersey.

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"The strange absence of Atlantic seashore deposits in the triassic period may be accounted for by supposing that the dry land stretched farther out to the eastward, and that the seashore deposits were formed, but are now submerged." * The first gulf represented to the west occupies about the place now occupied by what is called the palisade range of the new red sandstone, which is about three hundred and fifty miles long, and from five to thirty miles broad: so we know that there must have been a gulf at that time as large as this, where the sandstones were deposited. The most western gulf represented on the map, into which flows a large river, is partially represented to-day by ranges of red sandstone in North Carolina.

BIRD-REPTILES OF LEBANON.

JUNE 25, 1873.

With a piece of cream-colored limestone from Mt. Lebanon, probably of cretaceous age, Sherman saw the following: —

"I seem to be a long way back in time. A large rock goes out into the water, sea or lake; and on that are a number of bird-like reptiles. (The water is very still: it is fresh.) They are as large as a turkey, and dark colored. They have no wings; but their short fore-feet seem to be about half-wings. Sometimes they hop like kangaroos, putting their fore-feet down; but generally they walk on their hind-feet alone. They have three toes on the hind-feet, and four on the fore-feet: they are all joined by a web, except the

* Dana's Manual of Geology, p. 440.

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tips; and there are claws on both feet. Their bodies are thickly covered with stout bristles. The skin is black, and the bristles not so dark. They have no teeth, but a bill like a bird (1). (See Fig. 101.)

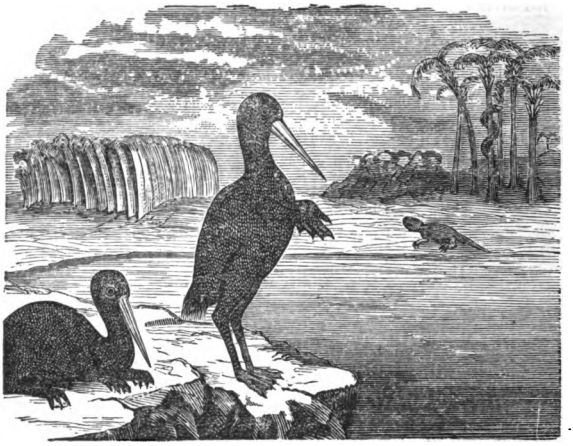

FIG. 101. — Bird-reptiles of Lebanon.

"Now I see some curious reptiles with small bodies and enormous heads. They are about seven feet long, and of a dirty color; and, like the frog,

'For convenience' sake they wear
Their eyes on the top of their heads.'

They have a bunch of stout bristles under the throat, — a kind of beard. (Draws Fig. 102.)

"They are good swimmers. There is no web uniting the toes; but each toe has a web like a dabchick's.

"They seem to be friendly with the bird-reptiles.

"The young bird-reptiles look very odd, quite white, and like a chicken with its feathers picked off. The fore-feet look like a wing when it is picked, or a turtle's

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flipper, though it often walks with them. They are very playful. They jump, and enjoy life.

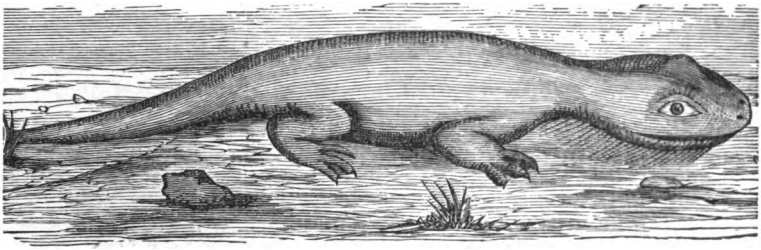

FIG. 102. — Bearded reptile.

"I see some just coming from eggs laid in the stump of a tree where the wood is rotten. The nest is nothing but small fragments of rotten wood."

("Have the eggs a hard shell?") "Yes: they are hard, and slightly buff-colored, four or five inches long the longest way, and the same shape at both ends.

"I see quite a large snake, some kind of a tree-snake, fifteen feet long, and very thick for its length; about six inches in diameter. The tail is very short." (Draws Fig. 103.)

FIG. 103. — Short-bodied snake.

("What is the vegetation like?") "Ferns and palms, — tropical plants. I see one strange-looking tree. (See Fig. 101.) Those long ones are blossoms, I think: yes, they are.

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"I see a curious leaf, twenty feet high, and three feet broad, thin as paper, and all cut into slips at the end. It is ribbed, and is some kind of grass. (See Fig. 101.)

"The root is as thin as the plant, and keeps getting narrower. I see a kind of marsh, where there is a field of this broad grass for three or four miles. They do not grow in disorder, but one behind another."

(1.) Another of those linking forms, between the reptile and the bird, which abounded during the jurassic and cretaceous periods. The bill and body are very bird-like; and one might fancy those "stout bristles" to be incipient feathers. There were, however, I think, true birds long before that time, supposing the time to be as recent as the cretaceous.

THE ZEUGLODON.

Several years ago, Dr. Koch of St. Louis, having read the first volume of "The Soul of Things," sent me some small fragments of bone, which he was desirous that Mrs. Denton should psychometrize. He made no statement then regarding them; but, after I had sent him the following, he informed me that they were portions of the skeleton of the zeuglodon found in the eocene-beds of Alabama.

"I realize the immense period of time since this age: it is awful. What a mere speck of time our life is!

"I see the open mouth of a very large animal: it is before me, and I cannot see beyond it. The jaws are large, and furnished with teeth that are quite long. The whole framework seems strong. It resembles a

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serpent somewhat, but more an alligator or a crocodile. I cannot see the whole; but it is of monstrous size. I do not think it can be as long as it seems to be (1). It swims, and lives on fish (2). What a monstrous creature! It has a ferocious look. It seems as if it never would be satisfied. I cannot imagine what it is.

"Now I have a side-view of the head. I never saw any thing so formed for strength before.

"I cannot see the eye; only the socket. The bony ridge above the eye is large and rounded, and bevels inward to a hole about three inches in diameter, and then expands again. It is not very quick: there is no necessity; for it can master all it comes in contact with. I do not see the outside of it; but I get the influence of a thick, tough skin, covered with crusty, scale-like plates."

(1.) When full grown, the zeuglodon is supposed to have been about seventy feet in length.

(2.) Owen calls the zeuglodon a carnivorous whale. Prof. Winchell, who critically examined its skeleton, calls it an alligator-like whale. It lived on fish, without doubt.

SOUTHERN MASSACHUSETTS IN TERTIARY TIMES.

In the southern part of Marshfield, in this State, is a bed of marl, or green-sand, very similar to that of New Jersey, and probably of miocene age. I gave to Sherman a fossil bivalve from this bed; and the following describes what he saw: —

"It is a very dusky day. I see a lake, and a forest all around it. The water is very warm. It seems as

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if there must be a boiling spring in it. I see a great many lizards and shells; but they are small. Some shells on the muddy bank near the lake are large. The forest is, I think, pine, poplar, and fir. The water in the lake is salt (1). I don't see what makes it so warm.

"I see a small elephant (2) on the land. There is something the matter with its hind-leg: something has torn a piece out of it. It makes a terrible noise, and hits every thing with its trunk that it comes to.

"I see a strange animal in a tree. It is a quadruped with a very large head and mouth, and small body. It is covered with black hair. It has two membranes covered with hair, like the wings of a flying-squirrel, that come over the front: they are fastened on the back; and it opens and shuts them. It is pretty dark now; and, when it opens them, a light shines on the leaves like a lantern. I can see it a long way off. There are others. It lives on insects that see the light and come to it; when it catches them. It lives on beetles. The membranes were not folded up, but, when stretched back, gradually contracted into two slits, — one on each side of the back. It has a soft mouth. The teeth are not much harder than nails. It moves its head slowly from side to side. It is brighter near the throat than it is below. It is as bright under the throat as the kerosene-lamp. When the wings are folded back, and it is all open, there is no light at all. It grows fainter as it puts it back; and, when it is all open, there is no light at all. It is brightest when nearest together. Some are black, and others brownish.

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The black ones give the best light. The light seems to come from the inside of the membrane.

"The animal's body is as large as that of a big cat. I see a good many of them all around. There are millers and mosquitoes here; but it does not care for them. It has so large a mouth, that the bugs cannot escape. We need it now. It is a slow kind of animal. It rolls itself up in the daytime like a duck-billed platypus.

"When feeding, it stands on the two hind-legs; and the wings come over the fore-legs.

"I should think those animals would soon destroy all the insects, there are so many of them. I saw one put out its light. Their wings look something like red rubber stretched. When they come together, they fold up nicely. All these animals have nests. I do not think they go off their trees. On every tree where I see one, I see a nest. It is built on a branch, and they go in at the side. It has a cover to it. When these animals go to sleep, they make a noise like young chickens, 'Peep, peep,' but faint. They make the noise with the nose by breathing through it."

(1.) He calls it a lake; but it was probably a bay, nearly land-locked.

(2.) Geologists first become acquainted with members of the elephant family in the miocene period.

Mrs. Denton, on one occasion, saw an animal very much like this luminous beetle-devourer. It differed widely from every existing mammal; but hosts of strange living forms have gone, leaving faint indications to ordinary eyes that they ever had a being.

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PEBBLE FROM CAIRO, EGYPT.

JAN. 21, 1870.

Examined by Sherman.

"I am near the sea, on the beach. I see lots of animals like lobsters; only they have coiled tails, and round. I can see a great many fishes; and these animals catch them with their claws. They go along by moving their tails.

"Back of here it is level land: there is not a hump two feet high. It is nearly all woods.

"There are a great many wild animals round here. Tigers lie upon rocks like cats, and purr. They wet their paws, and wash their faces, like cats. One is watching a bird, and is crawling down the rock so as to get to the back of it. How softly it goes! It has seized it. It is about as large as a partridge. It has carried it on the rock, and is tearing it to pieces."

("Can you see yourself there?") "Of course I can; as plain as I can with my eyes. My hands look cleaner than they are now. (He means cleaner than the hands of his body, which were somewhat dirty at the time.) I can feel them too. I can see the place on the nail where it got caught in the wheel of the fanning-mill. I can see my feet; but there are no boots on. I am not clothed anywhere. I am not *now*. But it is like feeling two things at the same time. I am here, and feel my clothes; and then I am there, and don't feel them (1).

"It is licking its face. It has got through eating. I see some little furry animals in the trees looking down on this tiger." ("See if you can tell what

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country it is.") "It is near where Europe and Asia join together."

(1.) The sensations of all psychometers that I have tried indicate that the past has an actual spiritual existence; and nearly all of them have the sense of being present in that past, and they are able to realize it by all their senses as they realize by their physical senses the present. The spirit of the psychometer who goes back to this past resembles the man in the body, as he is generally recognized, in many respects; possesses all the organs apparently, and all the senses; feels its individuality so strongly, that it calls itself "I;" and recognizes that past so really, that it speaks of it generally as present. In some respects it differs, however, considerably. It can move by will more rapidly than light, and seems to be superior at will to all influences. It can feel the oppression of the heated air of the summer's day of a million years ago; but can plunge into the crater's open, fiery mouth, roam round in its glowing caverns, and come out unscathed. The cool breath of the evening is felt on the brow; but it can move without a shiver through the frigid regions of space that are more than two hundred degrees below zero. At will, too, the spirit can clothe itself in such habiliments as it desires, and obtain objects of various kinds by merely desiring their presence. And I think these experiences of the psychometer reveal to us in some respects the powers of the spirit when death releases us from the body, and ushers us into that realm where is to be found the real and the abiding.

Watching a psychometer when examining, one might suppose him to be in a perfectly normal state, with the

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eyes closed; but this is not the case. All the senses at such a time are quickened: sounds and smells that would be unnoticed at other times become exceedingly unpleasant to bear, and sometimes destroy entirely the ability to delineate. The psychometer, as I think, passes very rapidly from the normal to the abnormal condition, — so rapidly, that, as Sherman remarked, it was "like feeling two things at the same time;" that is, he felt in the abnormal state, then passed to the normal state, and felt; and the time was so short, that he did not realize its passage. When it is done more slowly, he is in one condition, and feels them; and then in the other condition, and does not feel them.

It will be noticed that the psychometer frequently changes the tense from past to present as he passes from his abnormal to his normal condition; and, in like manner, he sometimes speaks during an examination as if in a distant locality, and then as if present at the place of examination. I have preferred to retain these peculiarities, so that the reader might be better able to judge of the actual feeling of the psychometer during the examinations.

GLACIAL PHENOMENA OF THE DRIFT PERIOD.

In the first volume of "The Soul of Things" I have inserted some examinations in which phenomena of the glacial period — that most remarkable time in the world's history — are described. The psychometer, in those cases, was, of course, somewhat familiar with the time by previous reading; but, in the three following examinations by a boy of nine or ten years of age, we have descriptions — and, I think, very vivid and accu-

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rate ones — by one who had not read a line upon the subject, and whose knowledge of it now consists almost entirely of what he has been able to observe psychometrically.

The first examination in which the drift phenomena appeared was made in March, 1866. The specimen was a clay-stone nodule from drift-clay near Ottawa, Canada. Nothing was known by him regarding the specimen.

"I see a large bowlder rolling down a steep place into the sea.

"Oh! right up in front of me is great ice, as thick as thick can be. It is moving. It shoves the bowlders along. That must be where the bowlder came from. It sounds as a sleigh does when going on bare ground. The bowlders scratch so, it makes the cold chills run over me. There is a crack in the ice; and I can look down and see the stones scratching each other. It is sliding fast down toward the sea, — faster than I can run (1). When it went in, it sank away down, and came up all in pieces.

"I am up now. I can see the ice for a great distance, and the cracks in it. How they shine in the sun! I can see the colors of the rainbow in many places. There is one place where the stones have all been ground into mud. The mud is coming out from under the ice in a stream. There are bowlders on top of the ice: it is covered with little ones. There is one monstrous bowlder nearly as big as this room.

"I am on shore now; and I can look out on the ocean, and see a great many islands of ice. How they glisten in the sun! One dashed against another then, and cracked a piece off one side. It seems warm. I

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see the air rising from the ice like steam. In some places it is soft on top. One island came by then, very large and peaked.

"There is a peninsula running out into the ocean. One of the icebergs went against it, and some of the rock flew up on the iceberg: it hit it such a blow! There is an animal on that peninsula that looks like a bear.

"I find places back from the sea where there is no ice at all; and it seems pleasant as can be. There are trees; some of them near the ice. One touches it on one side. The tree is very tall; but the ice is four times as thick. I saw an icicle drop off at the top, and stick in the ground. It was by the tree, and broke off some of the branches.

"That is the strangest thing I ever saw. I was down on the side of the ice, and a piece of ice slid over, and made it all dark. It is cold down there now. It bent the great tree over, just like bending a twig. The bark slid off, the tree squeaked, and away it went." ("See where the ice comes from.") "It goes as far back as I can see for the horizon. I cannot see any place where it comes from. It is nearly all ice. Back from the sea, the air is pretty cool. It is sliding on everywhere; and I can hear the little stones grind underneath. The sea is thick with ice now. One could travel on it a long way. (When I first took it in my hand, I heard the stones grating before I put it to my head.) The country is all covered, all white; and the stones look like black specks in the distance.

"That peninsula has not been touched yet, only by

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the iceberg that struck it. There are many trees on it, but most on the isthmus that joins it to the mainland. One is coming down to it now. It goes pretty slowly through those trees. I can hear them squeak under the ice. It is over the isthmus now, and on to the peninsula. It has gone to one side. How horrid the place looks now, all covered with mud and fine ice, and the trees just rising up a little! It is all torn and tattered. There are places where the ice has gouged it out, and the water is springing up; and other places where it has left great heaps of gravel and bowlders. It was done in ten minutes. Those trees look dreadful. Their little heads are just sticking out of the mud, and are all covered with it. One tree on the end of the peninsula has not been touched yet. When the ice went into the sea, the waves dashed up very high. Two of those icebergs came together, and the water flew up higher than the top of them. As they go along, they make a current in the water. There are not many peaked bergs: they are mostly flat. It is sunny and clear; but the ice makes it cool. I see some come down and balance on the water, and then slip down into the sea. One with a big rock at the bottom sounds like ten thousand men filing saws. I see some of the bergs melt till they are nearly round."

The next examination was of a small limestone bowlder from New Brunswick, taken also out of drift-clay.

"I see icebergs that look like mountains. There are cracks in them, showing all kinds of colors. There are some men in the water in a little canoe.

I see a man riding in a sled drawn by some kind

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of deer. There is nothing green here; no plant of any kind.

"I see the back of a whale away off. He is floating and spouting.

"Water has been pouring down from the top of an iceberg; and it has made an icicle that is very large, and seems to be two hundred feet long.

"An animal in the water has a fish in its mouth. It has two great long tusks. It raises up the ice. It scared me. I see now it is a walrus. There are many of them. There are large white birds on the icebergs: why, the air is black with them! I see three seals too. It is quite cold. I see another whale. The spray that he throws up comes on to me. He is a monster. There are great holes where he spurts up the water. It makes a kind of roaring noise. I don't see many kinds of birds, but a great many of those white ones. They have a curved bill. A large walrus is floating on a cake of ice.

"Now I see an animal that looks something like a whale. It spouts water, but has a long horn of bone away out, and something white, that looks like a clear part of the bone, winding round and round it.

"A white bear is running after a man. The man has stuck a spear into its mouth. He is covered with fur. He has killed the bear, and is pushing it, one end at a time, toward his little ice-house. I see three more white bears now.

"Those men have not much forehead, but large backhead. They look stout, and are dark-complexioned and tough. I see a number of their ice-houses. One man is going to spear a walrus. There is iron on the end of his spear. He has a long rope to it."

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(1.) The ordinary advance of a glacier is very slow, — not more than from six to ten inches a day; but near the sea, where a declivity was steep, and there was nothing to prevent progress, masses separated from the main body would move with great velocity and immense power, just as he describes them.

The unity observable in these examinations is one of the most interesting features. The ice shoving the bowlders; the crevices in the ice, or cracks as he terms them; the prismatic colors reflected from it, and the bowlders on the top of it; the icebergs in the ocean; the men drawn by "some kind of deer;" the walrus, whale, white birds, and white bear, — are all in keeping with the time. Nor is there, as far as I know, one unlikely statement, unless it is that there was iron on the end of the spear with which the man attacked the walrus; and even this is possible, as meteoric iron has doubtless been used by savages for such purposes from a very early time.

COMMENCEMENT OF THE GLACIAL PERIOD.

Glacier-scratched pebble from Syracuse, N.Y. Knew the character of the specimen.

"I see the ice sliding along into the ocean, and melting. There is a great bank where the ice comes down from a high hill, and tips over into the ocean. It seems to be nearly through; for I see a good deal in the ocean. There it breaks all up into pieces." ("Go back and see the cold time come on.")

"Oh, I see it! It is hailing great masses of ice, large as my double fist; and it is snowing too, — very

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large flakes. The hail makes a great noise when it comes down, the pieces rattling against one another. The air is so dense, it is almost as dark as night. Before it came on, some animals were there. I can see the big chunks of ice hit, stun, and kill them. They fall, and kick till they die.

"I don't think any thing could escape from that. I can just see a light place where the sun is: the rest is dark as night." ("See how far it extends.")

"I see places it has not yet reached. Great cakes of ice are coming down. I hear them go splash into the water.

"Oh! how strange it is to see it so, and then look up and see it all light! (I could not hear that sewing-machine at all.")

("Rise above the storm.") "The clouds look as if they were the ground; and the wind is driving them along. The cloud is for hundreds of miles right along, and you could walk on top of it. The winds won't let it down: it blows it off slantways. You ought to see the sea! The waves are high as any mountain. I can hear the ice break and crack. (I am below again.) Now I am up. It looks good to see the sun above it all. The cloud seems like ice on water. The air holds it up. It is not in one mass, but in pieces. To go through it seems like diving. The wind is very violent: it is blowing every thing before it, even this very large hail after it reaches the ground.

"The cloud goes along as fast as a locomotive. It builds a great wall of snow and ice as high as this house as fast as it goes, and leaves it level behind, filling up higher and higher; and the great wall travels

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in front. On the ocean I can see the water thicken and thicken as the cloud goes. The country is all pleasant and nice south of that." ("Go north through it.") "I have gone so far, that I am past it. That cloud seems travelling round the earth. It is clear and cold, and all snow beyond it."

There are many facts which indicate that the glacial period came on very rapidly, — the occurrence of the remains of mammoths and rhinoceroses, the flesh still upon the bones, in the ice-cliffs of Northern Siberia; the finding of the wood of large trees in the drift-deposits of Kansas and Iowa, — trees that could never have grown in a time of intense cold, such as must have preceded the glacial epoch if it came on gradually, the absence of fossils indicating a gradual change of climate. From the luxuriant life of the tertiary we pass at once to the drift, which, with but little exception, is entirely destitute of fossils, as the land during the period of its deposition was of life.

Sherman's examination — and it has been corroborated by other independent psychometric testimony — indicates a sudden change in the inclination of the earth's axis, and an instant condensation of all the aqueous vapor contained in the atmosphere of the new polar region, and this precipitated at once on the earth. But, if this did take place, our planet must have returned eventually to its original position, or nearly so, and that gradually.

THE COHOES MASTODON.

When visiting the Geological Museum at Albany on one occasion, I found James Hall, the well-known

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paleontologist, busy putting up the skeleton of a mastodon, found at Cohoes, in the State of New York, in a pot-hole, and covered with drift-material. I obtained some small fragments of the skeleton, and subjected one of them to psychometric examination by my sister, Mrs. Anne Denton Cridge. A portion of her statements corroborates remarkably some of those in the previous examination.

"I see a monstrous reptile like an alligator. It must be twenty feet long. Its tail curls up. There are many younger ones. The climate is warm and moist. It reminds me of the heat and moisture of a hot-house. Every thing indicates a warm climate. The air is full of insects. There is life everywhere. I feel afraid to step among these lizards large and small. One is blue, with large eyes. How hot the sun is! It is now setting after a hot day. If man was ever here, he was wild. There are monkeys here. What a horrid one I saw then! It looked neither like an orang-outang nor a gorilla. These small reptiles don't trouble the monkeys much. I see them seize the lizards, and dash them to pieces against the trees. The monkeys are as large as a boy of ten, and very strong.

"Now I see another animal with a very large body, a small, pointed head, and large eyes. Its mouth turns up, and is somewhat bill-shaped. It is a reptile, and has very short legs. Its mouth is not large. There is life under every stone. It is raining. How it rains! What drops! Those animals care not: they are safe under the vegetation. There is a great deal of moss. It must have been in this condition for

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ages. The material gathered from leaves and trees must be thirty or forty feet thick. I am standing near a bank of it. What a fine hiding-place for reptiles! I see a big one under there now (1).

"It is cold, cold: how cold it is! Here are icebergs floating; and, as they come along, they melt. Bowlders and gravel are swept in, and cover up every thing. The ice seems to spread over every thing. That is a wonderful change. I can see ice-mountains thousands of feet high. There seem to be glaciers. It is dark overhead.

"The cold seemed to come on suddenly."

Second examination, same specimen. Nothing yet known of its character.

"I can see the reptiles, and an animal that looks like a bug; but it is as large as a crab. It is on a stone; and a reptile seems to be making for it. It is an insect, and can fly, but not very readily. It has antennæ, and convex, immovable eyes with many lenses. Its wings are a very dark brown; and its head is dark brown and yellow mixed, and the legs black.

"It looks horrid when turned over. (I turned it over.) It has jointed, hairy legs. I can see with the naked eye what it would require, in the normal condition, a microscope to see (2). It is shaped something like a bee. Its wings are clear. The back is broad and dark. It has a sheath for its wings. It must be ten inches long, and five broad. The crocodiles ate them. There is one making towards it.

"Now the cold is coming" (shivered). "I see icebergs coming, and bowlders dropped. I can see great quantities of gravel over animals completely

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buried. It comes from the north. Bowlders are dropped everywhere. There is no animal life. Some animals were frozen in. From being tropical, it becomes frigid. It is not sudden in one sense. It took a long, long time to deposit that gravel that I see. There are fields of bowlders, extending for hundreds of miles. It looks as if snow, and eternal fields of ice, had broken away in the north, and rushed to the south.

"I see a current of water at the north pole not frozen. There is a warmth there that has extended itself under the ice, and sent it south. It looks as though the sun was shining over the north pole. There is an open sea, and an open channel from there down.

"The whole ocean was affected everywhere when that cold time came. It affects the whole globe (3). I see a volcano at the north pole. What a tremendous volcano! How the lava pours out! but what a long time ago! Now there are other volcanoes bursting out."

(1.) This seems to be a description of the country previous to the drift-period.

(2.) This I have frequently observed in psychometric examination; so that the examiner can frequently see what occurred millions of years ago better than if he had been on the spot at the time.

(3.) In the infancy of geology, men who were investigating the formation of the crust of the earth supposed they saw everywhere evidences of great convulsions. More recent investigators, with Lyell at their head, discovered, as they thought, that agencies

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such as we now see at work had produced all that we behold. The truth probably lies between them. Most of the geological formations have been deposited by the peaceful settling of sediment in ocean and lake; but there have been at times, I think, terrific convulsions, such as history has never recorded.

The same specimen was examined by Sherman, who also knew nothing of its character. He obtains from it glacial influences, and the character of the country and its inhabitants as they probably were just before the drift-period.

"This takes me among the glaciers. They look handsome. I see lots of stones on them. I see the peak of a mountain, almost as straight as the side of a house. It is all snow and ice.

"A glacier is coming down between two ledges, and it spreads as it comes out. I see the snow dropping on to it at the upper part all the time.

"Oh! underneath the ice, water is running. I see a little brook rushing along. Down below it is very cloudy, but clear enough where I am. I see some bears up here,—brown bears, about as large as a Newfoundland dog. I see them pawing about bushes. The snow is quite hard on the side of the mountain; almost like ice. I see a bear that has come to a bush with red berries on, which look like the fruit of the rose.

"I see a river now. Why, it seems as if it would tear away the mountain! Great stones go down in it that must weigh a ton. It is very roily. It sweeps down gravel. I can hear the stones strike when it has

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a fall over a cliff. It splashes the water over the banks, and sweeps the mud away. The brook I saw under the glacier went to it; but it was clear compared with this river. It makes a great noise; but, away from there, it is very still.

"I see a deer now galloping over the river, leaping from stone to stone. It is amazing what a little stone it can stand on."

A few days afterward I tried him with the same specimen again. He knew that the specimen was the same that he had previously tried, but still knew nothing of its character.

"I am at the same place, the same mountain. I see the track of a deer that I saw before. That's funny." (I then said, "Go back a little, — ten or a hundred years.") "I don't know that I can go so little." ("Go back just before the cold time came on.") "I see it now. There is a good deal of difference. It is much more pleasant. I am about a year before it. I see some deer now. There is snow on this mountain, though, now. I see some small, handsome birds with blue tails, and red on their heads. I see another kind of bird with a thick bill.

"I see an animal, that, I think, belongs to the elephant family. It has a little short trunk and two tusks. It is not as large as an elephant. It has very large teeth: they have white ridges and hollows across them. It has short hair on the body; longer under the fore-legs. I don't like the look of its head: it looks deformed, — big cheeks. It seems to be all alone. It smashed a snake in two with its trunk very quickly. When it sees a tree as it walks along,

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it eats some of the leaves off it, and then, as it leaves it, twists its tail round it, and pulls, so that I hear the tail crack before it lets go. It pulls some of the trees almost over. The tail twists round some trees two or three times.

"I see a deer with the largest horns I ever saw. It is like an elk. The horns are flat, but branch out. I see some wild horses too. They look very nice. They are mostly dark brown. They look more shiny than Boston horses. What pretty hoofs they have!

"I see an animal going through the grass after the horses. It is very pretty, spotted like a leopard. It takes large leaps, and looks up at the horses, and then leaps again. (There are great numbers of rabbits. I see them darting in every direction). It is near the horses. It trembles. It sprang on to one, and bit into its back. The horse is bleeding where its hind-claws stuck. How the horse runs! and what a curious sound the other makes! It had to get off, though, the horse went so fast, and shook it. It is licking its paws. It is going back to a river, and now it is drinking. Now it lies down, and looks at a grasshopper. The flies are plaguing it. This grasshopper is pretty: it has a red body and green wings."

("See if there are any human beings.") "I see the most curious turtle I ever saw. One-half of its bill, and one eye, and part of its head, are gone; but it is all healed up. I see no people at all. It was warmer then, a good deal, than it is now.

"I see a barren place, where nothing is growing, near some mountains. I guess they are the Rocky Mountains (1).

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"I see a man now, — an Indian. Oh! if he is not a curious one. I never saw one like him before. He has a spear about three feet long, made of wood, with stone at the end. He is perfectly naked; only he has an ornament round his neck, — white stones, with holes through them. His head is flat, and large behind; and he is quite dark for an Indian. His hair is straight and black, but not long. He looks as if he did not have much to do to get a living. How straight he can aim! He is trying what he can do. He held the spear in his hand, and drew it back three times, and then struck a stone right in the centre. (I cannot see any more. It stopped all at once.")

The next evening he tried the same specimen again, knowing it to be the same, but still knowing nothing of its nature.

"I'm in a different place now. It is before the drift. I see one of those mastodons dead. It has very long tusks. It is a male. It has not been dead long; not more than a day, I think.

"Oh! I see the largest turtle I ever saw. It is making a hole to lay its eggs; for I see it scraping the dirt out, so busy! It uses its head for a shovel, and lifts the dirt out. How round it makes the hole! It came to a large worm, and ate it. It is sitting over the hole. Now it goes to scraping again. She was just trying it. She has laid an egg now. It is round, and no larger than my fist; and the turtle is as large as a tip-cart. She lays an egg about every half-hour, I think.

"I see another large mastodon. I think it is the largest I have seen. The ground sinks when it steps on

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it, — even the grass-land. It is lying on the ground, and turning over like a horse when it rolls. I can only reach half a foot above the knee on the hind-leg; although I could not walk under without touching it. This pulls trees with its tail too. It seems to like to do it. I see it pull a branch down with its tail, so that its trunk may reach it. There are large warts on its trunk.

"Now I see about a dozen baby elephants. How nice they play! They hit one another with their trunks. I don't like the smell of them. Their tusks are just coming out. On the end of the trunk there are two little things, like fingers, that they catch things with. There is beautiful grass here, as pretty as any lawn. It is not more than six inches high, and looks like fine hair on an animal.

"I see a very fine horse eating the grass. It does look well.

"I see a little snake with four little legs; but it scarcely uses them. It cannot be a lizard; but, if it is, it is the next thing to a snake. It has a forked tongue."

("What kind of trees do you see?") "Oaks, and some with leaves a foot broad, and a foot and a half long. Those trees are low, but wide-spread. The oaks have a very fine leaf." ("Any insects?") "Yes: great numbers. I see a kind of bee with a reddish-yellow body. I see a very handsome beetle with a blue shell and black legs, and yellow at the bottom; but the smell is horrid. I am by the same river that I was before."

("Can you find those men again?") "I see a place where they have had a large fire.

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"I see some large birds away up in the air. They have hooked bills, black wings, and red necks, — raw-looking. They are very large, — larger than an eagle. They fly very easily, and hardly move their wings. (This is near where I saw the mountains last night.) The birds eat large rabbits. One doubled its wings, gave a scream, and down it went on to the back of a rabbit. Its claw went right into the flesh. It is flying to a mountain now that has snow on it. While it was flying, it sucked the blood of the rabbit from the hole its claw had made. I can see three frogs in its stomach, and a lot of other stuff, — some feathers. Now it has reached the mountain, and is tearing it up. The frogs in it are larger than those we have now. I see part of a snake in it too."

(1.) Probably the Adirondack.

GLACIAL PERIOD IN MAINE.

Most of the examinations recorded in this volume have been made by members of our own family, for the reason that it was so much more convenient, and not because others do not possess the power. I find that the faculty by which the examinations are made is not a gift so exclusive as to be possessed by but one in a million; and I have been surprised to find that several persons who had given but little attention to the subject previously have been able to make very satisfactory examinations when the experiment was tried. The following experiment was made with Mrs. Nellie L. Palmer of Portland, Me.; the specimen being a pebble of granite, with barnacles attached, dug out of a bed of shells lying between two

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glacial beds in Portland, and at a height of eighty feet above the present sea-level. She saw the specimen; but I am quite sure that she had no idea that it was connected in any way with the glacial period. The specimen was held in her right hand (March 15, 1871), and not placed to the forehead.

"It seems a good deal colder than here. It seems an awful cold place, — sharp, strong, stinging cold (1). This is but a small piece of a great rock that seems to have been worn smooth and small. I seem to be going on and on (2). It seems to have been poured down a slope that lay at about an angle of forty-five degrees (3).

"Water seems to be carrying sand, pebbles, and mud round and round.

"This seems to have been a large rock on the side of a high hill; and something comes along and breaks it off. It is not water. I do not know what it is. It carries it along, and rolls it over and over, and breaks it up. (This is a long time ago.) The seasons change. They become shorter as I come this way. There were only two seasons away back.

"This moves slowly; yet it makes a noise, — a dull, heavy noise, grinding like heavy machinery. As it goes, it takes up every thing, and carries it along, — stones, shells, bushes, and every thing (4).

"This was away below the water, and then was lifted up (5). All at once I come into the light. There are large rocks, bowlders, near where this was, — large ones, and a great many of them. They are rounded by being rolled and ground round. There is not much fine gravel" (6).

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(1.) The cold of the glacial time must have been of this character.

(2.) She appears to obtain the motion of the glacier. It is quite common for some psychometers to feel the influences that have operated on the specimens they are examining.

(3.) There is just such a slope where the specimen was obtained.

(4.) The action of a glacier is very accurately described.

(5.) Beds there, that were below the water-level at the glacial period, have been lifted up eighty feet.

(6.) There are a great many bowlders, and of considerable size, near where the specimen was obtained.

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CHAPTER II.

ASTRONOMICAL EXAMINATIONS.

A BOY'S VISIT TO VENUS.

THE first astronomical observation that we ever made was in 1860, and is recorded in the first volume of this work. The first examination that Sherman made was in Ohio, near Painesville, in 1866. We were in the orchard in the evening, after supper. Venus shone like a young moon in the western sky: and I said, "Look at that star; and then shut your eyes, and tell me what you see." What he said I wrote down, as best I could, by the light of the stars.

"I see it round, but all rough. I guess it is more hilly than this world. The mountains seem higher than they do here (1).

"I see a tree larger than these round here, just like a toadstool. It is a kind of purple color. It has a monstrous trunk, larger than any I ever saw before. I see many of them. They are as thick as the woods down here. There are not as many on the mountains as on the plains. Inside of the trees is jelly-like stuff as sweet as honey. I tasted it. There is something hard inside that I spit out.

"I see a kind of animal, half fish and half muskrat.

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The tail part looks like a fish, and the rest like a musk-rat. It is in a brook, or stream. Under that stream is a kind of rock, from which something rises like gas, that is very poisonous. It is a great deal warmer there than here. It seems almost as if it would burn me, it is so hot. The sun looks larger, — very nearly twice as large (2).

"Just then I saw a shooting-star from there. It changes from day to night, and from night to day (3).

"The water is heavy, — heavier than our water, — and it does not wet. It feels cool; but it does not wet my finger. It is clear as crystal; but it is hardly water. What would you call it? It runs; and, where there is a fall, it comes down hard, and makes an awful noise, — *clump, clump;* not steady (4).

"The mountains are almost perpendicular. I have to put my head back to see the top.

"I see no trees with leaves on. They are all of that toadstool shape, or they have a few branches on them that end in roundish knobs (5). The roots of the trees go straight down, and curl like a corkscrew, getting smaller and smaller. Every thing is very different in that world from ours.

"As I went to it, I could see it as big as this house, then growing out on both sides till I was on it."

(1.) According to Schröter, there are mountains on Venus five or six times as high as our highest peaks; but Herschel seems to think that mountains no higher than those on our planet would account for the appearances observed by Schröter. It seems, however, to be generally agreed that Venus is mountainous.

(2.) An observer on Venus would be about twenty-

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five millions of miles nearer the sun than one on the earth; and the sun to him would appear as much larger in proportion as 729 is to 400, or "nearly twice as large."

(3.) As I understood him (though I did not question him at the time, lest it should disturb him), he saw the planet in the light and in the dark. Part of the time it was night, and part of the time day; and he therefore saw it, not exactly as it was, but as it had been at some previous time. This introduces an element that needs to be taken into account when considering the reliability of these investigations. Psychometers readily pass from one time to another, and are not always aware of the change.

(4.) Is it possible that some other liquid takes the place of water on Venus? or was this some local peculiarity?

(5.) Trees in this form would evaporate much less, and be therefore better able to bear the extreme heat to which vegetation may be exposed on Venus.

Sherman, at that time, was nine years of age, and did not even know the name of the planet that he was examining. An older person, acquainted with the facts of astronomy, might have guessed at the conditions there after this fashion; but this the boy could not have done.

VISIT TO A COMET.

While examining a date from one of the Theban tombs of Upper Egypt on July 20, 1870, Sherman said, quite unexpectedly,

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"I am in a place where it is night, and I see a very large comet. It is the most splendid one I ever saw. It has a star-like head, and the tail curves and broadens toward the end." ("Visit it, and see what it is.")

"I guess it will be something like going to a rainbow.

"No: it is not like that. It looks miles long and wide now.

"There are a good many masses, and they are burning. Some are no larger than seven or eight rods through. How globular they are! What can be the reason of that? The largest attract the small ones; and then they fly off again, and that makes it sparkle. When they throw off the little planets they whirl tremendously, and make a great noise. Sometimes they hit against others. What magnificent fireworks! All are whirling. Some little ones are no larger than this room. Oh! isn't it handsome? This is in the tail part of it.

"I think I see how it is made. It is one big planet at the head; and all these seem to be pieces of it, as if it had been smashed. It seems to be going at a great rate. Do they ever go? There is a tremendous noise. A long way off, it sounds like an enormous sky-rocket.

"The front of it is the fieriest part of it; and it goes so fast, that it keeps it on fire. It seems as if it was burning away. It seems like a great meteor (1). When I am there, it does not seem to go at all. As the little pieces go to the tail, they burn out altogether (2).

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"When I am on the earth, the comet seems still. As those planets whirl, they keep their heads in the same position (3).

"The head of the comet is a large planet: I don't know but it is as large as the earth" (4). ("Advance in time, and see what becomes of the comet.")

"Why! it keeps getting smaller (5). What can be the reason of that? The head now is quite small. It looks almost exhausted. It could not be seen from the earth now. It does not seem over a mile long now altogether; but it is going as fast as ever.

"It seems to turn its course now, and go off to another planet. That is the last I see of it."

("See where you are.") "I see no people, and no signs of any. It is a very swampy place. A man in there would die before he could get out. This comet gives nearly twice as much light as the moon. Oh, what a place this is! There are crocodiles and turtles that look like snappers. I see some long-necked white birds, very handsome. They fly in the night."

(1.) Since this examination was made, the identity of comets and meteors has been announced as established. "In the year 1862, the denser portion of this ring of meteors — through which the earth passes annually on the 10th of August, and which causes the display of falling stars — was seen in the form of a comet, with head and tail as the densest parts, approaching the sun and earth in the course of that month." * When we have meteoric showers, as about the 10th of August

* Science Record for 1873, p. 539.

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and the 13th of November, we are passing through the tail of a comet. The meteorites composing it, coming in contact with our atmosphere, burn in consequence of the friction between them and the air, and we see their fiery track on the evening sky. So little did Sherman know of this, that he did not even know that comets travelled, as his previous question shows.

(2.) That is, they became invisible to him.

(3.) As I understand him, the direction of their whirling motion was at right angles to the direction of their motion in space.

(4.) The younger Herschel was of the opinion that the faintest clouds were dense, compared with comets. But some other astronomers differ materially from him in this. "The mass of Donati's comet has been valued by MM. Faye and Roche at about the seven-hundredth part of the bulk of the earth." *

(5.) This, though remarkable to him, is by no means uncommon. When in the vicinity of the sun, the tails of comets generally acquire great length and breadth; and this is probably at the expense of the head. As they recede from the sun, the tail becomes invisible, being probably absorbed into the head.

VISIT TO A SMALL PLANET.

We had been making examinations of Mars and other planets for some time, when on the evening of the 10th of June, 1869, the weather being somewhat misty, Sherman said that he could not see Mars; and

* Guillemin's Heavens, p. 261.

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I asked him to find and describe some other planet, if he could. In a short time he said, —

"I am at one, — a very barren place. It seems like a young world. There is not a tree on it. It seems one crust all over. (I saw a fine meteor just then.) It is all cool too; solid through (1). There is not a drop of water on it. It seems to be a small planet, and turns over about twice every hour. There are cracks in it almost half way through. It looks like pumice-stone. It is very light. It is perfectly round, except the cracks. It does not seem any more than five miles through. I see pretty veins in the rock on the sides of the cracks. They look like the dross of lead. A man would not weigh much there. There is no sign of life. The night is dark as pitch, and cold; and the day hot, and very bright, so that it dazzles my eyes (2). The black rock reflects the rays of the sun.

"There are no mountains, nor any elevation at all. It is all smooth but the cracks that have been formed by cooling. There is no air at all.

"There are some metals in it as heavy as lead. There are round balls of metal in the inside that show in the cracks. They are round and glossy. They look like those silvered glass globes I have seen in stores, and they are as smooth. They are metal itself.

"There is so little weight, that, when a fragment gets loose, it does not stick. I see some that go up, and then down till they nearly touch it, and then rise up again, — some as high as thirty feet" (3).

("See if there are any other planets near.") "I am attracted to this one.

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"When I rub my hand on some smooth bubbles about half a foot high, there is a black powder that rubs off. I can see it on my hand: I feel it too.

"I can hear the planet crack like ice under my feet once in a long while. If a man could earn a dollar a day there, he could make some money in one of our days. The two biggest cracks are about a mile wide.

"There are lots of pieces of this planet away up,— enough to make a planet a mile through. Some are mountains, and they go round the planet in circles like the rings round Saturn (4). They would be rings if they stuck together. They turn round on their axes, but slowly,—not nearly as fast as the planet (5). The circle goes round as fast as the planet."

He pointed to a place in the heavens, about twenty degrees south of the position of Mars, as that where the body was located.

(1.) I think it probable that this was one of the asteroids, or small planets, between Mars and Jupiter, cooled to the centre in consequence of its diminutive size.

(2.) There being no atmosphere attached to this small planet, as he subsequently learns, there is consequently no modification of the heat of the sun, on the one hand, nor the intense cold of space, on the other.

(3.) The centrifugal force generated by the velocity of the planet is about equal to the attractive force on this small orb. A very similar condition of things was seen by my sister, Anne Denton Cridge, at Wash-

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ington, D.C., at a time when she had not heard of this examination; as, indeed, she has not yet.

In a letter from my brother-in-law, Alfred Cridge, he writes, —

"On Jan. 7, 1870, while examining Venus, Mrs. Cridge saw Mercury, and also a planet whose orbit was within that of Mercury, and of which the description is as follows: —

"'It is about one-eighth as large as Mercury, is uninhabited, and entirely volcanic. Though sufficiently adhesive to keep together, it is rather liquid than solid. As I see it moving round the sun, I can perceive large and small portions of matter, here and there, in constant motion, alternately attracted by and repelled from the planet, something like a number of balls tossed by a juggler. The planet gathers up floating particles of matter, apparently, as it proceeds. There are no indications of life whatever, — not even of vegetable life.'"

(4.) It is now generally supposed by astronomers that the rings of Saturn are composed of bodies that are thus revolving in circles around the planet.

(5.) If this statement is correct, the fact seems strange. In accordance with what he has generally observed in the case of small satellites, it was to be expected that they would move with great velocity.

A COLLISION BETWEEN TWO WORLDS.

Between Mars and Jupiter there is a space of about three hundred and forty millions of miles, in which more than one hundred and thirty small planets have been discovered. The largest is a little less than the

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moon in size; and the smallest not more, probably, than twenty miles in diameter. The astronomer Olbers suggested that these small bodies were fragments of a planet which had been destroyed.

Without thinking at the time of these bodies, and without Sherman's knowledge of their position, or even existence, on the evening of Nov. 13, 1870, while looking at Jupiter, he said, —

"Oh! there are a great many little stars between that star and here, — very little ones. I came across them as I was going. I see one no bigger than this house. There is a hump on one side; but it turns so fast, it is all I can do to see it. What a noise it makes! — a buzzing noise. Some are not more than a rod from another. I see two so close, that I could step from one to the other. One of them is quite long, and another is about a mile round. It turns round about once every minute; but the motion is unsteady. Some are going one way, and some another. Sometimes they strike together, and fly off again. Pieces are knocked off, and they twirl round; but most of them fly back to the large ones again. It looks like daylight where I am. I can see the sun."

("Can you go back to the time when they were formed?")

"I am back to a time when they were all together. There were two large ones about half the size of this world, I should think; and they ran together, and smashed to pieces. There was melted matter inside of them too; and I can see that boil up, and fly every way. Those worlds were quite round; only they were much broader one way than the other, — round, but

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flattened like a cent, only not so much (1). I can see them grow smaller after they broke off (2). There are larger pieces away off that I cannot see. This star (Jupiter) does not look any larger from the little stars than it does from here, that I can see" (3).

(1.) Jupiter's rapid motion on his axis has caused his equatorial diameter to be forty-nine hundred miles greater than his polar diameter. Had his axial motion been sufficiently increased, his shape would have been like that which Sherman describes these planets as having.

(2.) Some fragments would grow smaller in consequence of loss of heat; and others, perhaps, by collision with neighboring bodies.

(3.) The nearest known asteroid is more than a hundred and fifty millions of miles from Jupiter; and Jupiter, from that distance, would not, probably, look any larger. It would show no disk, though it would look brighter than it does from here.

A few evenings afterward, while examining Jupiter, he met with the small planets again.

"I came across those little stars again. There are not a great many of them; only a few hundred (1). What makes them turn round? There are only a few compared with what there were. I see one that is pretty large: it seems like half of a planet that had been split.

"I declare! I cannot go more than half way; then I stop. I try to go, but stand still. I don't get along any. I seem to go back as much as I gain (2).

"As I am going, I can see some of the stars shift

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their places; and I can tell by that whether I am going or not, and whether the stars are far off or not.

"I see some trees growing on one of those little planets, which is no larger than our place" (thirteen acres). "The trees are very small, — no taller than a man; but they have the shape of trees."

("Is there any water?") "No: I see no water, — not a drop; but I see clouds, though. The planet is not round, but flat; a few hundred feet thick. It goes round fast; but, when I am on it, I do not notice it at all (3).

"I see a small beetle on one of those trees, a little larger than a lady-bird. There is a good deal of grass. It must rain sometimes. It is very warm all the time. The rocks are of a reddish color, and look very hard.

"I see one planet that I saw the other night." ("Can you see the moon from there?") "No." ("Look at the earth.") "It looks very large, — about as large as the moon (4).

"I am on the largest. I see a couple of lakes on it. I can see the heart of it. It split right through the centre; and I can see the rings of rock. It is mostly of a red or chestnut color, with dark rock that makes the rings. There are forests here. It is quite a world, and looks very much like this. I see where there have been great caves, and they are all exposed. Where it broke, it looks like a great plain, over which you can see such a long, long way, with masses of rock sticking up here and there over it. A man could walk on it just the same as the other; but nothing grows there. It is nothing but bare rock. One could tell in a minute that something awful had happened

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to it. This world turns round slowly; I should think, in about half a day. There are some very smooth hills (the matter must have been melted when it split); and others are all ragged and craggy."

(1.) This, I think, refers to the group in his vicinity.

(2.) When making such examinations as these, my opinion is that the spirit flits back and forth with great rapidity, and almost unconsciously; and this seems to be true when examining the distant in time. This inability to move at will is not uncommon; but no psychometer seems to be able to give the reason.

(3.) Any more than we notice the rotation of the earth.

(4.) That is, of course, impossible. The earth could only be merely visible from that distance; and he probably mistook some asteroid for it.

A BOY ON THE SUN.

A few months afterward he examined the sun, sitting where its rays could shine upon his forehead.

"I see a world all lava. I tell you, it is hot. It is all an ocean of fire. It is so hot, that a body would melt a million miles off, or turn to a black coal. It is not fluid, like water. You could run on it in places. They move about; and it is slowly getting more crusty."

Spectrum analysis has now demonstrated that the sun is an intensely-heated body; so hot, indeed, that many metals with which we are acquainted exist in its atmosphere in the condition of vapor. The statement

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that it is not fluid does not agree with subsequent examinations that he made, but may refer to the "places" on which a person could run, — sun-spots, as I think.

He made a second examination of the sun in October, 1868.

"I can see mountains. Now I am on the sun. The mountains are heaps of lava in great waves. It is not near as bright when you get there (1). It is all lava, tossing every way. There are dark places in it, like those on the moon. They are like foam on water at a waterfall. It is all full of bubbles. All the dark places look reddish, not as bright as the rest (2). Oh, it is beautiful! but it looks better away off. There are cracks in the dark places down to the light. It is so bright, it dazzles my eyes. The dark places are not very thick: they do not seem to be more than a foot (3). I see streams of pink, blue, green, and yellow, flowing about. The yellow looks the brightest. I think they are different kinds of metals (4). It looks as the earth did once, or as it is inside now; only there are no dark places there. Two waves, as high as any mountain I know of, come together, and dash up the matter.

"It is like being in the ocean on a log, out of sight of every thing. It looks pinkish through the smoke; but, when you get to it, it is of different colors. I never saw such pretty colors. It is of no use to try to tell it. It cannot be told.

"There is black smoke rising from the surface all over, and from the cracks in the dark places (5).

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The surface shakes and trembles all the time, and rumbles as I have heard a furnace in a foundery when iron was heating. That smoke is black, and smells worse than sulphur. It goes up and forms clouds, but they are not thick, and then disappears. The surface is bright for thousands and millions of miles; and then comes a dark place. I see a large blue stream that flows among the lava, like roily water among clear. I don't like being here: it is just like having the nightmare."

He described several planets between here and the sun. I may give some of the descriptions, which are very interesting, at some future time. (I said, "Go into space as far as you can.")

"Now I am away out of every thing. I can see nothing at all: it is all dark. I cannot see my hand before my face. I do not believe I could see a candle, it is so dark. The farther I go, the colder and darker it gets. It is terrible. It seems as if I could never get back. I can see something away back, like a pin's head or a fire-fly off on the hill. I guess it is the sun. Now I cannot see it at all. It is horrible! I must be blind (6). There is a peculiar smell here, — splendid! It smells like strawberry-essence or perfumery (7). I am tired. I cannot go any farther."

(1.) The intense brilliancy of the sun may be caused by flames in its atmosphere; and the body of it may be much less brilliant.

(2.) These dark places to which he refers are, as I think, the sun-spots, which, although they are much darker than the rest of the sun's surface, are, never-

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theless, intensely heated. When Mercury was making its transit over the sun, the spots seemed the brighter.

(3.) Sherman's view is most in harmony with the theory of Ennis. "The spots," he says, "are solid bodies, floating in the midst of flames on the liquid surface of the sun; and they are formed of incombustible chemical compounds." * That they are thin is indicated by the fact, that they have been seen to break up and disappear while under the telescope of the observer.†

(4.) In the light of the now well-ascertained fact, that various metals are burning in the sun, it is quite probable that rivers of variously-colored metals are flowing about upon its surface.

(5.) This, at first sight, seems very unreasonable, but less so upon mature reflection. We may suppose that whatever burns on the surface of the sun rises as smoke till it reaches a layer of oxygen that will cause it to inflame. The attraction of the sun then draws the condensible products back again as rain, only to burn again; while the more refractory material collects, and forms spots, till in time they are reduced, burned, and disappear, to be succeeded by others. This, I think, well accounts for the facts known with regard to the sun and its spots. The spots appear to occupy cavities, because the smoke and flame tower above them for an immense distance.

(6.) He seems to have been in that immense sea of darkness that separates our solar system from the rest

* The Origin of the Stars, p. 93. † Ibid., p. 92.

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of the universe. I have never yet met with a psychometer that appeared to be able to cross it.

(7.) The imagination is lost in attempting to account for this. These grand celestial spaces are by no means unoccupied.

MRS. CRIDGE'S EXAMINATION OF THE SUN.

I have received from my sister, Mrs. Cridge, a series of psychometric examinations of the sun, made in January, 1870. They may be published entire at some future time. I give the following extracts from them, which may serve to give a general idea of what she perceived at the centre of our system.

THE ATMOSPHERE OF THE SUN.

"After repeated trials and repulsions, I finally succeed in entering within the sun's atmosphere. From this *atmosphere* we receive our heat and light. It is so dense, that it strikes one as strange that it should be gaseous. It is luminous, and intensely magnetic. . . .

"I am conscious of being at the heart of the influences controlling the solar system, realizing (though ignorant of details, or methods of action) the thread of connection between the sun and the planets, — realizing that which causes them to revolve around that immense magnet.

"Here, in its intensely-magnetic atmosphere, I pause. So dense that it might be regarded as a condensation of all bodies, it is, nevertheless, vapor, composed of many elements; magnetism, such as

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inheres in the loadstone, being its central life, and which, existing in a much more concentrated form in the body and heart of the sun, causes the planets to revolve around that body. Being here at the centre of attraction, there comes from afar a realizing sense of other attraction operating *on* the sun, which causes it, with its attendant planets, to walk, as it were, among the stars. . . .

"I find myself within the sun's atmosphere, which is of wonderful density, being composed in great part of substances, which, at the highest temperatures known to us, would be solid, but here are gaseous.". . .

THE HEART OF THE SUN.

"And now I endeavor to penetrate to the very heart of the sun itself. I leave one part of myself at the threshold, sending another and more subtle part far into the interior. I go on and on and on, until all is one molten mass, — not a dark speck in it, — clearer than crystal, yet not crystallized; without flames, without fire, yet far more subtle and pervading than any heat of which we can conceive. Language fails to convey an adequate idea of its calm intensity. I think it is wholly electrical; but will examine farther. It is not a *consuming* heat; in this respect differing from the heat in the sun's atmosphere. . . .

"I am confident that the great power operating in the heart of the sun is magnetism, which becomes modified into heat as it approaches the outer portion (1). I see that no cooling process is possible at the

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sun itself: that can only take place after the material has been ejected into space. . . .

"The material in the very central portion of the sun, though so highly compressed as to partake of some characteristics of a solid, is, nevertheless, gaseous (2). The compression to which it is subjected is so enormous, that, were it gross matter, it would be harder than any thing of which we can conceive. I can give it no name. I know of nothing akin to it, unless it be the attraction of the needle to the loadstone. This attractive power is tremendous. I can look at it; I can place my hand on it; and it impresses me as containing sufficient power to bring to itself every planet in the solar system. I can perceive the globular particles of which this attractive material is composed, and that they are constantly in motion among themselves. They would be, probably, invisible to the physical eye.

"On receding from the centre of the sun, no marked difference in the intensity of this force is experienced until the outer portion, or atmosphere, of the sun is quite near: then the sensation of pressure perceptibly lessens; there is an approach to grosser matter in a gaseous state; and the whole is in motion, having its calms and its storms. I have but a dim perception of the causes of these movements. I perceive, however, quite clearly, that the sun not only has a motion around its own axis and around a central sun, but that the particles of matter of which it is composed have a constant motion among themselves.

"The great bulk of the sun is composed of this

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powerfully-attractive, highly-condensed, but gaseous material, which reaches to its centre. Near the outer portion of this material the transition to the outer layer of the sun commences; the same interior material, however, permeating the whole, and embodying the essential principle of the magnet, without the grosser matter by which the magnet is accompanied."

(1.) From this and other psychometric examinations, I think it probable that electricity and magnetism are different forms of the same matter, which constitutes the heart of the sun, as it probably does that of the earth and all the other planets of the solar system.

This involves, of course, a complete revolution in the commonly-received opinion regarding these so-called "imponderable agents," which are possibly only regarded as imponderable because we have hitherto been unable to obtain them in such a form as would make their gravity perceptible.

(2.) Mrs. Denton, who has made several examinations of the sun, without knowledge of those made by Mrs. Cridge, and which she may publish at some future time, regards the matter at the absolute centre of the sun as more dense than any substance with which we are acquainted, and as impenetrable by any known physical force.

THREE INDEPENDENT PSYCHOMETERS EXAMINE THE PLANET MARS.

Mars is, in many respects, the most interesting planet visible to us. We can see it better than we can any of

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the other planets, — better than Mercury, because Mercury is too near the sun; better than Venus, because it is not so cloudy; and better than the other exterior planets, because it is so much nearer to us, the nearest being eight times as far off as Mars when it is nearest.

The astronomical examinations of Mars give us strong indications that it must be the abode of life. The day of Mars is but half an hour longer than ours. Its year is six hundred and eighty-seven days. Its diameter is a little less than half that of the earth; and bodies weigh, in consequence of its less gravitating force, not half as much as they do here.

In many other respects, this planet resembles the earth much more closely. Clouds have been seen in its atmosphere, and even plain indications of fogs and mists. The outlines of seas and continents are visible; and two snowy caps, covering the north and south poles, are seen to enlarge as winter approaches, and diminish as summer returns. It has been noticed that the sky is most cloudy, and the features of Mars most obscured, in winter, as is the case with the earth; and even changes from hour to hour — as the morning fog is dissipated, or the evening mists appear — are observable to the telescopic seer.

In Mars, the land and water spaces appear to be about equal. The water forms long inlets and straits; and it is said that a traveller might sail almost round the planet with land constantly in sight on both sides, while those who dislike water-

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travel might visit nearly every portion without the necessity of trusting themselves to its yielding surface.

From what the astronomer knows of Mars, there are rains and snows, and elevations and depressions of surface; therefore springs and rivers; hence sediment in the waters, and alluvial formations and sedimentary rocks. The fact that land exists above the water-level indicates a cooling globe, ridging up as the disintegrating agencies wear it down. In fact, it must be a world very like our own, and well fitted for the sustentation and development of life.

If there is life, what are its manifestations? Does the vegetation resemble that of our own globe? Are there animals, and, above all, human beings? What is their character? Do they sin and suffer? Are they savages such as, at one time, the best specimens of our race were? or have they all ascended the heights of philosophy, near the base of which we are painfully climbing? To such questions, and a thousand others, Astronomy can only shake her head, and confess her ignorance. But the soul has a telescopic eye of keenest vision, as much superior to that of the body as the spirit is superior to its material envelope.

Many persons, clairvoyants and others, have given descriptions of inhabitants on Mars, Jupiter, Saturn, and even on the sun and moon, — descriptions differing very widely from each other, as some of them differ very widely from known astronomical facts. Some persons have professed to see the inhabitants, and describe what appeared to their vision; while others have

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informed us of what they said departed spirits had revealed to them. How are we to know which account out of the number is the true one? or whether any is true? The only way, it seemed to me, by which we could arrive at the truth, would be to obtain independent examinations of a planet by various parties, no one of which should know any thing, previous to the examination, of what the other had stated. Three independent examinations have thus been made, which I present. Not a hint was given as to what might be expected, or of what had already been received from others; and the reader can judge, from the evidence presented, whether there is any reason for believing that we have obtained any reliable knowledge of our sister planet.

THE ANIMALS OF MARS.

Sherman's first examination.

On the 12th of January, 1867, Sherman made his first examination of Mars, not knowing, at the time, even the name of the planet.

"I see a thorn-tree with large thorny apples on it. I see no animals. Yes: I see a snake winding up a tree, and eating something that looks like a little white cabbage-head.

"I have come to the seaside, where the water makes a peninsula. The sun does not look as large as it does here, — about one-third as large (1).

"I see a monstrous animal like a turtle, all covered with conical spines, even on its legs. It has four legs and a stumpy tail. It is a mud-turtle, but eight or nine feet long.

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"This world seems flat, like ours. It is a real clear day; but it is not as light as it is here. It does not get as much of the sun's light. The water does not taste like our water. It has a sweet taste, or half sweet.

"I see another turtle coming out of the water, and still another. They are eating animals with long legs that are spotted, and jump, but are not frogs. There is a rock, near where I saw the turtle, of a reddish-gray color.

"I see an animal jumping from tree to tree. It has very great paws, and reaches from one to the other, and springs. It is as large as a horse, or larger; and has short bristles on its body. The trees are monstrous. Those with apples on are not so large.

"There is a great deal of water here. From a high place, where I am now, I can see hundreds of lakes.

"What a lot of little turtles I see at the bottom of the water, scrabbling and piling on each other, and squeaking! There are thousands of them no larger than a hen's egg, with little prickles over them like needles. They bite hard too. There is a big shell there, and they are eating the meat out. One has run off with a piece, and the others are after it. Two are pulling at one piece. One turtle has got the door of the shell, and is going off with it. The shell is as large as a peck-measure.

"I think it is near the equator. The sun shines overhead all the time. The sun is not perfectly straight overhead: it slants a little. It is not easy to move about."

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THE PEOPLE OF MARS.

"I have come to a place where the people are crowding into a little house that looks like a summer-house, where a man is standing with a basket of flowers. It is a statue, made of something like plaster of Paris. They have on strange-looking square caps. The men and women wear the same kind; only the men's are larger.

"Now I see a great temple. They are going in rows, and divide near the statue as they go into the temple. It is very large and high. I see them going up winding stairs, up and up. Some are giving out, it is so hard, and sit on the stairs by the way. They go up a flight; and then there is a place to walk, and another flight. It is so high, that the men at the bottom look no larger than my finger. I can look over the houses to a beautiful lake, another city, and another temple, that I can barely see. I do not see that they are doing any thing but looking off. Now I see a place where people go in; and there are several statues. One man has his head bent over, as if praying. The people look at the statues: and some point to that man, and talk; but I cannot understand them.

"The people are darker colored than ours, and have four fingers instead of five, — three fingers and a thumb. Their toes are the same. All that I see are barefooted. No: some have a little thing under the foot, that seems made of metal, to keep stones from hurting them. Their faces are not as pleasant as ours. Those statues have four fingers too. The people have sixteen teeth in the upper jaw, and sixteen

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in the lower. They have large, wide mouths, cut farther back than ours. The hair is yellow. I tried a number, and they had blue eyes. I see no beards, but just a few bristles on the chin. All the people are out of their houses, at the temple.

"The streets are paved with stone; and the houses are nearly flat: some are flat. I see windows, but no glass in them. I can hardly see through them. They look like mica. The houses are rather dark inside. They do not fear robbers, or they would not leave their houses this way. I see a pile of hats in one place.

"I see something that they eat. It is white, and something like bread; but it is not. I see shelves in a place like a kitchen.

"They have clothes that half cover them. They dress like Indians. Their legs are bare, — all of them that I see.

"I forgot to tell you that their eyes are like cats' eyes. The pupils are long: they look queer. They have what I suppose are chairs. They have four legs, but no backs; and the legs slant. The houses have no doors like ours, that I see. They are open, — just an entrance to go in and out. The streets are wide, — three times as wide as ours. The top of that temple came up something like a French roof. It seems warm, like summer weather."

In answer to questions, he said, —

"The men wore reddish pants and blue jackets. Some of them carried banners that glistened in the sun. Their clothes seemed to be made of a coarse kind of cloth."

(1.) The apparent size of the sun from Mars is

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between a half and a third as much as it is from the earth.

Here are snakes, turtles, small long-legged jumping animals, large bristly jumping ones, mollusks, and people so like the human beings on our own planet, that the differences between them would hardly be noticed. Although I had great confidence in psychometry, the story he told seemed to be a somewhat unlikely one, and more probably a reminiscence of the earth than a revelation from the stars.

The great types of life, as we know them on our planet, may, however, be universal, as true for Mars and Jupiter as they were for the Silurian and Devonian periods; and the perfect human form may be the highest form that matter can assume, and toward which it is everywhere striving, as it strove for millions of years on our own globe.

PHOTOGRAPHS AND FLYING-MACHINES ON MARS.

Sherman's second examination.

On March 25, 1869, — that is, more than two years afterward, — Sherman examined Mars again. As before, he did not know the name of the planet; nor do I think that he knew, before he examined it, that he had examined it previously. An independent examination of this kind would be, I thought, a test, to some extent, of the accuracy of the previous examination.

"It seems as if I was in a city. I see drawings like colored photographs: they must be colored by the light itself. The people are very curious. I see some that have hooks on their feet with springs, so

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that they go over the ground fast. They have them on their hands too. There is no house made of brick or wood: they seem to be made of a kind of stone like rough sandstone. Their roofs are steep. The stones are flattened off, and look well. The roofs are all covered with points, and look thatchy. They have some kind of stuff like glass, but so clear, that you can hardly tell that any thing is there. Their shoes seem to be elastic at the side, and metal at the bottom. The women dress the same as the men. Some wear a kind of white cloth.

"Well, they have got a new thing there. It is something like a velocipede; but it is a flying-machine, that goes along about three or four feet from the ground. Some of the best riders make it go as high as a house. I see one place devoted to that kind of amusement. There is a high railing round, and people are looking at them. The way they steer is most curious: it is by making the wheel on one side go faster than the other. Some go backward, — the best riders. How they enjoy it! It makes a great noise. They move both hands and feet (1). They have some strong and hard stuff something like bone, but much lighter than wood. (I see no one smoking anywhere.)

"Ladies ride on those machines: they are not as hard to drive as a velocipede. It is the most curious to see them go backward. There is a square block at the bottom, that seems heavy, and has spikes in it to make it stick. It is drawn up as soon as the machine goes. Two persons ride near together forty feet up, and talk to each other. They believe in wearing a long mustache. None of them shave, I

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think. Some of them dare to fly over water with that machine a mile from the land. They go faster than birds. There are a great many of them in this green, grassy place. People give something that is white and round, like a medal, to two men who have forty or fifty of these machines. On each side of the medal is a picture of one of these flying-machines. This seems to be the place for all kinds of exercise.

"I see men with those springs on their hands and feet: they spring and jump great distances with them.

"The flying-machine is about ten feet long. The person pushes a large wheel, and the cogs on that make a small one go; and then a belt from that makes fans go *so* fast!

"I don't notice any difference between them and the people here; only they have large foreheads, and their heads are large, and the hair does not grow down as low on the forehead as it does with us (2).

"Well, this caps the climax! It is a monstrous head, about twenty feet across, all made of pieces of wood joined together, and put in so nice, that you would not know but it was all one piece of wood carved into shape. A great many men are at work on it. It is on the outside of the second story of a large building. The stories are very high.

"It does not take me long to go to that planet. (What planet is it?") (Told him.) "The people are very industrious. Those fliers can go round a circle. I see them flying round and round like birds. The machine is so light, that they lift it readily with their hands. In the air it looks as if it could not be real.

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"I see a man taking pictures of those flying-machines. They come out of a dark box all ready painted. The box is longer than wide, and is made of hard wood — if it is wood — like maple. The artist takes something like paper, and puts it in the box slantwise, and leaves one corner up, and turns a glass at the other end of the box, slanting the other way. It is about an inch thick in the middle, flat on one side, and thins out to the edge on the other. Then he covers the glass with his hand for a second, takes hold of the corner of the paper and pulls it out, and there is the picture on it. That is all I see. But there is something under the box, and very fine wires, like hair, that come up near the glass. The largest pictures I see are about a foot square, and as natural as life. Their glass is more transparent than ours. It is not glass, I know. The people do not seem to notice the artist much.

"Is this the planet where I saw the three-fingered people? I don't see any now. These have all four fingers, and eyes like ours.

"This man keeps taking one picture after another, and puts them in his pocket. He has packages of hundreds of papers."

("See if you can find any books.") "Oh, yes! plenty; but I cannot read them. I see signs too, like short-hand writing. Their words are not made of letters. Their signs are gilt. (Draws Fig. 104.) I see

FIG. 104. — Word-signs.

that where there are books for sale. A man is piling

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them up. They are printed, and open in the middle. They are made of very thin leaves. I see one book about flying-machines: there is the picture of one on the first page. The printing is all like the signs. I see many different kinds of books. They are not printed the same as ours. Every thing is in tip-top style. There are a great many flourishes. The words are pure black; and the flourishes are pink, at the end of every sentence.

"All the pictures in the books are done with the photograph. The men's faces who wrote the books are there, so real!

"Is that planet older than ours?" ("Yes, probably.") "It is as warm there as here on a fine day in the latter part of April. The people look very healthy and strong."

("Travel round a little.") "They have a nice way of raising fruit. To heat the room where they have it, water goes through pipes under the soil: they have fire under it that turns the water into steam; and at the end there are fine holes, where it comes out in steam in the soil, and warms and moistens it at the same time (3). Sometimes it comes out so hard, it blows up the soil.

"I see a fruit like the strawberry, as big as my fist, and as round as a ball. It tastes something like strawberries with sugar and cream."

After the examination, I questioned him on some points.

"The men with springs spread their legs out, and then brought them together, and sometimes turned somersets: they seemed like circus performers. The

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enclosure holds about twelve acres. Round the fliers would go, and over the fence, and return. They looked like big butterflies when away off. The people wear beards, whiskers, and mustache; and their hair is of different shades, as here. They use broad, flat nails, that are sharp at the sides; and I saw a machine for pushing them in."

(1.) With the force of gravity not half of what it is on our planet, and with an atmosphere probably denser than ours, aerial navigation on Mars must be very much easier than here.

(2.) This is evidently a distinct race from those first seen; and they live, as I think, in a region extending from south of the equator high into the north temperate zone.

(3.) This might be turned to practical account on our own planet. The fact that they needed hothouses seems to indicate that the locality was the temperate zone.

A MONSTER KITE ON MARS.

Sherman's third examination.

While I was from home, Sherman examined Mars (on April 20, 1869), and wrote out the following paper: —

"I was near a river where there was a plain, and boys playing with curious kinds of tops: they called them *maubs*. They are made of light metal that looks like iron (1). They hum very loud.

"Away back in the land, I saw a great sight. Some people there had a kind of kite. It was round, and about twenty feet across. The frame of it was made

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of that light iron; and it had a tail made of small rope about thirty feet long. On the end of the rope was a sort of basket, about five feet across, and two feet deep; and in this basket people got, and away they went up in the air.

"On the ground was something like a windlass, made of the light iron; and a man slowly let out a rope attached to the kite, and it went up about five miles."

On my return, in answer to questions, he said that the top was spun with an elastic cord, and went very fast. The face of the kite was made of some kind of cloth, that was prepared so as to be air-tight. Before the people got into the basket under the kite, they tried it with stones. When they sat in the car, they were careful about balancing it and in keeping the balance. There was a kind of break on the windlass to regulate its motion. At five miles high, the air seemed as good to breathe as on the ground (2).

(1.) He frequently refers to this metal, which seems to be aluminum. When we have discovered some easy method of reducing its abundant ores, we shall probably use it as commonly as he represents it to be used on Mars. A metal harder than zinc, of great strength, and yet lighter than glass, as aluminum is, would be of much service to us, if it could only be readily obtained.

(2.) The height that he designates was only roughly estimated. It seems probable, however, that the atmosphere of Mars is more dense than our own.

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HORTICULTURE ON MARS.

APRIL 30, 1869.

Sherman's fourth examination.

"I see a river about three rods wide; and something sends water out slanting on to the land. It is something man has made. There is a great wheel under the water, turned by the stream, which drives the water out of a pipe on the land to a great distance (1). It comes down like so much rain on some pretty plants there.

"Men come round, and squeeze the fruit into a kind of bowl. The juice is sweet, and pours out as if you were squeezing a rubber ball full of water. These plants need a great deal of water. I see them all along the river as far as they can make the water go. The juice is yellow. They squeeze the fruit daily. They carry off the juice in pails made of the same stuff as the flying-machines. The people wear shiny coats that are water-proof, so that the water does not wet them.

"There is a very handsome tree here, that seems to be covered with nuts, that have dark red-and-yellow bulbs under each. They cultivate them, and take great care of them. The trunk has a mossy look. The scenery is very pretty round here.

"This is a warmer place than where I was before; but the people seem the same.

"I see a plant with very red fruit, and thorny all over. It looks something like a strawberry; but it is not as sweet as it is pretty. They can't be grown for fruit. I see now. People come round when they are

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ripe, cut them in two, scrape them out, and use the material for glue, after burning it. It is something like pitch, and runs out black. Their knives are not made of iron, but of light, shining metal. The women are out working just the same as the men. They are all dressed very nice under their water-proofs, the women better than the men; but they are nothing like the women here. The women wear something like pants, and have pictures on them of flowers and things of different colors.

"Their dresses exactly fit their bodies, but don't injure them. They don't waste cloth in foolish things as our women do.

"The land was quite level where I was."

(1.) We have an immense amount of water-power going to waste along all our streams; and there are portions of the country, where, if water could be raised in the way indicated, lands at present quite sterile might be made very productive.

NIGHT ON MARS.

MAY 11, 1869.

Sherman's fifth examination.

"I seem to be in a very hot place: it seems tropical. I am where I saw those people with cat eyes. I see their four fingers again (1). It is the hottest place on this planet that I have seen (2).

"I am on the night-side now. How curious! I see northern lights, and lamps with reflectors, that show miles off, so that one can see very plain. You could read the finest writing by the light of those lamps five miles off. The people here are like us. The

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northern lights are very bright: they give a silvery light. The people seem to be out at night almost as much as in the day.

"The thing that I most admire is to see this world turn round, and the light going over the face of it. Where there are mountains, the stretched-out shadow gets shorter and shorter as it turns round. I seem now to be about five hundred miles off. Even here I can see the lights the people have, like little stars.

"I hear some singing in one room where they have one of those lights (3). They are earnestly engaged in singing. One man stands on a high place, and directs them. They have splendid tunes. After they have sung one song, he speaks; and they turn over their three-cornered books, and sing another piece. The musical marks are more curved than the word-marks. They do nothing but sing here.

"I see a place now where a man is lecturing to a crowded audience. They have round seats to sit on, without backs. He stands on a place a little higher than they are. The hall is about as large as Mechanics' Hall in Worcester."

VISIT TO A THEATRE.

("Look for a theatre.") "Oh, I never saw such splendor! There must be thirteen thousand people in this place. There is a stage made of that light metal; and there is something that resembles water so much, that you could not tell the difference unless you felt it. It moves too. It is made of pieces that are moved; and it looks just like water with a breeze blowing on it.

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"It is a representation of a cave by the water. There are stalactites and stalagmites in the cave, just as natural as life. They are made of this light metal too. There are hundreds of players.

"That is the funniest! They represent an animal under the water. You can see his form under this translucent" (he probably means transparent) "material. As it goes along it raises a dust, and that looks like roil coming up through the water.

"They dropped the curtain, and now it is a winter-scene. Some are skating on the ice, on broad, flat skates made of that light metal. It seems as if they were away off in the distance. It is done by pictures farther and farther off, and more and more gloomy. They are talking, acting, and laughing. It is something funny; for the audience laughs a good deal.

"Now it is the inside of a beautiful palace. There is a table; and a girl is getting something to eat, and singing away. A man seems to be chopping wood. I can hear him. She calls him, and he is coming. I never saw such a man. His beard comes down to his knees. They laugh now.

"Now they are pretending to eat. They have things made in pieces, and they pretend to cut them. They have a false mouth, connected with a bag, where they put what they pretend to eat. When I sit among the audience, it seems perfectly natural. They represent some of those fruits like large strawberries that I saw. They are talking all the time.

"The seats rise as they go back. They have splendid music. Their instruments are made of that light metal. I see one that is hollow and very thin.

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They strike it. There are about a hundred of them, of different sounds, like a chime of bells. They ring very much, and sound like one great instrument. They have some stringed instruments that look like banjos."

On questioning him after the examination, he said that there were two lights in the theatre, — one on the stage, and the other in the body of the building. The appearance of ripples on the surface of water was done by strips of material like glass, about an inch broad and a quarter of an inch thick, that were moved by machinery. Some of the actors wore dresses painted to represent leaves like the palm.

(1.) Sometimes he speaks of these people as having three fingers, and sometimes four; because, at times, he counts the thumb as a finger, and at other times counts the fingers without the thumb.

(2.) These people seem to live near the equator.

(3.) Though he does not say so, he had evidently returned to the planet.

WORSHIP ON MARS.

MAY 12, 1869.

Sherman's sixth examination.

"I see some boys playing ball. They have bats and balls made of something like rubber. They can make the ball go a great way. One boy hits the ball, and the others try to catch it. When one catches it, he hits it, and the others try to catch.

"I am now in a large palace, where there are about fifty figures of all kinds of men. The people are looking at them, and worshipping them (1). I hear them make a sound as if praying. They are in a hall about four hundred feet long, a hundred feet wide,

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and about fifty feet high. There is an instrument like a great organ, that makes a good deal of music. In the centre of the hall is one of those large lamps, that is very beautiful. The people are all dressed in white, with a gold fringe about their necks.

"The great musical instrument is filled with air, which passes out through whistles by pulling small handles that go slowly in after they are pulled out. The music is slow, but good.

"The statues are life-size, and painted to resemble men. There is a statue of a monkey-like animal holding on to a tree, and a statue of one of the best men by his side, to show, I suppose, how much man had advanced beyond the monkey. The statue of the monkey is covered with hair, fastened in when it was soft.

"The building in which they are is a splendid one. The people bowed down their heads, and seemed to be worshipping. A part of the time they sang and danced."

(1.) It seems unreasonable to suppose that beings as far advanced as they should worship statues; yet another psychometer formed a similar opinion with regard to them. Much of their apparent advancement may be owing to their proximity to a superior race.*

MACHINES FOR MAKING CLOTHES.

Sherman's seventh examination. MAY 17, 1869.

"The moon attracts me. I could go there very easily.

"I see a very curious animal. It has four legs, and

* See Mrs. Denton's examinations.

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a very thin neck, like a swan's or a snake's when its head is raised to strike.

"That has fled, and I am in a town or city. Everybody seems to be busy. The streets are very wide; and ropes are stretched across, and beautiful flags hang from them. They are all colors. I see pictures of a man on them, life-size, and beautifully painted. There are two hands, same as we have, pointing to two houses; and there are letters, but I cannot read them. They are something like Chinese letters.

"I see now what this man is for. It is for a sign. They make clothes here; and this man is dressed in their clothes.

"They have machines here that make the cloth and the clothes at the same time. They are made to resemble animals; and the teeth are made of long, sharp, smooth metal, thicker than telegraph wire. The thread is put in at the back, where there is a little door, and passes through the throat on to the teeth. The jaws go up and down, and that weaves it. It makes both legs, and then goes up and makes the arms, and all together as perfect as can be. After it is done, they cut it in two in the middle, put it in another machine, and turn over the edges. There is no seam in it. The machine lays them out on a table, and men pack them as fast as they are made. There are two or three hundred machines here.

"This animal chews up thread, and spits out clothes, like the juggler the other night, who chewed up tow, and spit out ribbon. It looks like a dragon or some great furious animal. It is about twelve feet long. For about two feet on the roof of its mouth, it is all

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teeth. As its jaws go, its eyes roll. It is painted to look very natural: you might almost think it was alive. It takes about ten or twelve minutes to make a whole suit. They have a machine to push the buttons in and fasten them, and another to make the holes. The thread is very much like catgut for smoothness; but it is not translucent.

"I think all the people wear clothes of that kind. Men come in and hand them little yellow, bright balls covered with impressions of heads (that is their money), and get clothes for them. They give one the size of a pea for a suit of clothes.

"I am glad to see that they use no tobacco here, neither smoking nor chewing. They have a nice, cool drink that is sweet. For a glass they pay a ball not much larger than a pin's head."

After the examination, in answer to questions, he said, —

"There was a man to every machine. When they were done, he sprinkled water on them, and handed them to another man. The power that made the jaws go went up the legs. You could hear it buzzing underneath the block the machine stood on."

FIREWORKS ON MARS.

MAY 20, 1869.

Sherman's eighth examination.

"The moon attracts me. I don't like to go there: it is too cold and desolate.

"I cannot see our moon, when I am there" (on Mars), "at all (1). I am on the night-side, and I see a light pass over the sky very rapidly. It is larger

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than our moon looks when full. It goes round Mars, and great multitudes are out looking at it. It seems very near. I cannot see any smooth outline to it. It seems like a fire, and sparkles. It flies round very fast. The people point their fingers to it. I can hear them halloo as it comes up. It seems to go round several times an hour. The temples and other high buildings are full of people looking at it. I never saw it before."

("What planet is that which looks so near?") "I see one planet that looks larger than any one does here. It looks as large as the door-knob (2).

"That light I saw is round, — a circle with points. It has no tail after it. It seems to be flaming. It gives a red light. I can hear the people shout away off as it gets in sight. I can see it on the day-side, but not so plain.

"It seems to go slower now. I should not wonder if it was some artificial thing. They have a telescope in a big building here; but they do not look at it.

"It goes very slow now.

"It dropped down like a stone; and I can see the light reflected into the sky. Why, it is nearly as big as this room, — fifty feet in circumference! It keeps sparkling; and people cannot get very near to it. It does not blaze, but seems to be melting down and running off. The people are round looking at it, and pushing sticks into it. Blue flames rise, curl round it, and vanish. It is nearly all melted (3).

"The people are going home, and lighting their lamps. I see nothing like rings or ear-rings on these people. They wear gloves that are made in the same

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way as their clothes; but they are made by a different kind of machine: it does not resemble an animal.

"They use steam there. I can see them use it where they make the gloves.

"They have a nice arrangement for washing. They have a box with paddles that strike the clothes every time. The clothes are stretchy when they are wet. They are very strong.

"They have very handy fireplaces. They carry the smoke down into water, and save it: it makes the water black, and keeps the air pure. They carry the thick material out for manure. They don't do that till the water gets thick. It keeps every thing very clean. They burn coal that smells very much of oil.

"The ceilings of the rooms are all ornamented with figures of many kinds, — birds, trees, and landscapes, — very beautiful. I see musical instruments that seem to be trumpets: they are made of gold or brass."

(1.) This seems to have surprised him; but, though the earth must be a conspicuous star from Mars, the moon, which is not much more than one-fiftieth part as large, would, to ordinary sight, be invisible.

(2.) This may be a satellite of Mars, too small to be seen by our telescopes.

(3.) This, from his description, appears to have been artificial. It may seem to be impossible upon our planet; but it does not follow that it would be so on Mars. It is only half the distance around Mars that it is around the earth; and the attractive force of the planet is only one-half that of the earth. With the great intelligence of the people, and their perfec-

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tion in the mechanic arts, they may be able to make a fire-ball travel in the upper region of their atmosphere with such velocity as to encompass their globe; though I do not suppose that it was done in the short space of time that he states.

BOOTMAKING ON MARS.

Sherman's ninth examination.

The following paper was written by Sherman on the 22d of May, 1869. Knowing that I should be absent on that evening, I requested him to see what he could, and write down a description of it.

"I saw machines for making boots. They are made of a kind of sap, which they get by boring holes in trees, and then boiling it down till it is quite thick: then they pour it into moulds. When it sets, it is like rubber. They take it out of the mould, and cut the inside out, and make it the right thickness with those machines. They put black material on, and polish them up, and make them beautiful. They can melt old ones over again.

"There are a great many machines for taking people about, that are worked by hand, and go very fast. Some have only one wheel, and some as many as six. They have springs on like carriages, so that they don't shake much as they go along the streets.

"They have a kind of lamp that is very safe. It has a sort of chimney that is all round the flame. It has no opening at the top, like our chimneys. It has no wick. There are four screws attached to little pipes that go down into some liquid like oil. The screws regulate the light. There are a great many holes underneath for air."

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RELIGIOUS BELIEF ON MARS INDICATED.

JUNE 3, 1869.

Sherman's tenth examination.

"They have an excellent way of melting things. They have a little candle made of black stuff like chocolate. Then they have a thing like a blow-pipe, with an elastic ball attached to it. They press it, and a stream of air goes out; but, as that goes out, more air comes in; and so it keeps blowing all the time. There are valves inside, some of which shut one way, and some the other. They can pick up a stone, and melt it right down (1).

"The man who is using it mends things in that way. He takes things that are broken, and heats them to melting; then puts them in a vice properly shaped, and squeezes them together, so that you cannot see where they are joined.

"I am in a large place now. It seems to be some kind of a theatre. Mercy! I think they must have religion there, and believe in some kind of a devil (2). I see a representation of a being with eight horns on his back, claws on his fingers about six inches long, and on his toes the same. The eyes stand out like lobster's eyes. The whole body is scaly and green. The teeth are about a foot long. There is a very large man inside. They have some people to represent angels, with imitation wings, sitting on stars, and held up by transparent cords. They look so natural! Some are represented as flying. The cords are moved above; and they slide along from one star to another, and make their wings go as if they were flying.

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"They have sinners there. The devil stamps on the floor, and then the sinners fall through flames into a place below; but they fall on soft stuff, so that it does not hurt them; and their dresses won't take fire.

"Now they pretend to have an army to kill this devil. They have a mortar, and blow its head off to the other side of the room; and it looks as if it was bleeding. The people shout and halloo. The soldiers are dressed very prettily. They have white feathers, and red hats with a blue band round them. They look as beautiful as light through a prism."

(1.) This was a blow-pipe of peculiar construction, and one that, it seems to me, would be quite useful to our mechanics.

(2.) If the highest embodiment of life on Mars is the human, and almost identical with that on our own globe, it is not unreasonable to suppose that the moral and religious development of the people there must have proceeded along similar lines to that of our own.

AUTOMATA, ETC., ON MARS.

JUNE 6, 1869.

Sherman's eleventh examination.

"I am in some great building, with statues that look so like life, that one can hardly tell the difference. The people are not here. The statues are fixed with wires, so that they walk, shake hands, and bow. There are seven or eight persons who take care of them. They are worked by machinery under the floor.

"They have a very curious thing here. It remains about two feet from the floor all the time, — just so

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high. As a compass turns to the north, and goes back when you push it to one side; so, when this is pushed down, it rises up; and, when it is pulled up, it sinks down again. Higher than two feet, it is heavy. It looks as light as pumice-stone. It weighs nothing where it stands. They slide it along. When they drop it, it bobs up and down till it settles in its place. They use it to measure in some way. The higher it is up, the more it weighs. There are several in this building. They are no larger than a thimble (1).

"I see almost everybody has one in his pocket. They are round as a marble, and glossy." ("See what they carry them for.") "I cannot see. They put them away very carefully. I think they measure heights with it by its weight."

(1.) With the diminished gravity of Mars, and the probably increased weight of its atmosphere, it is possible that a substance exists there whose specific gravity is less than that of the lowest stratum of the Martial atmosphere. In such a case, it would form a natural barometer.

THE FRUITS OF MARS.

JUNE 17, 1869.

Sherman's twelfth examination.

"I am in a beautiful garden, something like gardens here, but so splendid! What singular fruits! One is full of cells, like sponge; and it is nearly as large round as a bushel-basket: two of them grow on a stalk. The leaf is like an umbrella, but not more than a foot across. The fruit is like a strawberry

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outside. It is delicious, — something like pine-apple. It is light for the size of it.

"There are scaly fruits here like cones, as large as my head. They rip off the layer of scales to get to the white, hard part inside, which looks like a potato before it is cooked, but does not smell or taste like it.

"With what care men attend to the garden! There is a bug they watch for. There is a bush about a foot high, on which there is a fruit like a cherry, — round, smooth, and glossy. About fifty grow in a cluster. Another kind is round, and the seeds can be seen inside. It is hairy and yellow. They rub the hairs off before they eat them. The seeds are beautiful, and shaded from red to blue.

"There is another kind of fruit that has a brown husk on the outside. It is round and nice-tasting, — something like banana.

"I see a splendid way they have to make one kind of fruit. There is a kind of liquid that they have in a bottle, into which they dip something like a brad-awl, and then stick it through the leaf. The hole grows up; and then the spot commences to swell, and grows as large as an apple. They put salt on it, and eat the inside. The outside is hard. They punch every leaf on a tree. They squeeze the largest for the liquid to use over again. The leaf is thick, and rather leathery. The leaf *crimples* up; and, by the time the fruit is ripe, the leaf is dead, and what was the stem of the leaf becomes the stem of the fruit (1).

"They graft there; for I see a tree with six kinds of fruit on besides its own.

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"I see another thing. There is a large tree, with a thin bark like paper, that they strip off every year. They seem to use it for sick people. If they leave it on too long, it cracks, and comes off of itself.

"They have flying-machines to pick fruit off the trees. They have one that goes with the feet, so that they can pick with their hands. They guide it by pulling the branches.

"They have a fruit like our largest bell-pear, that grows on high trees. They boil these fruits, when they are hard, till they are cooked, and then cut them open, or they get soggy, and do not taste well." (The moon was shining into the room at the time; and he said, "That moon attracts me all the time. It pulls that side of my forehead.") "That seems such a nice way of picking fruit compared with ours!

"They have many roots, some no larger than beans, and some quite large. There is a mischievous bird that eats the large roots: it is especially fond of one that is round and like a radish. When there is a flock, they go after them with a flying-machine, and hit them with sticks. The roots are pulled up by the birds, which are not much larger than quails, but have large wings. Their yellow eyes look so curious!"

(1.) We have various insects that puncture leaves and twigs, and insert an irritating juice that causes them to swell, and produce what we call gall-nuts, oak-apples, fruit of Sodom, &c. This artificial practice on Mars probably began from an observance of a similar natural one.

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WINTER SPORTS ON MARS.

JUNE 29, 1869.

Sherman's thirteenth examination.

"I can see where it is winter. How they do love winter! They have sleds that almost make perpetual motion. They go down one hill, and nearly up another as high. They are the same shape at both ends. They have a thing that goes over ice and snow, with sails like a ship. I see boys, men, and women all out. They take special pains to make it icy. They have a pump on the top of a hill, and hire boys to pump water, so as to freeze, and cover it with ice. How smooth and glossy it is! They have a place to walk up. They have a kind of sled they can go up hill with. They work it with their arms. It has wheels, which they take off when they get to the top. It looks like a lame boy's carriage.

"There are suits made of steel, and jointed at the neck and legs, so that people can lie down and slide. They go like fury, — faster than any railroad-train. They go up with spikes in their shoes.

"I see a still better way. They have two hills made of light metal, with machinery underneath, that pushes one hill up, and lets the other one down. There are thousands sliding here. They pay those golden balls. I hear them talking, and see them making change. Only the men do it. One man shouts when all is ready. There is a place where they stop when they get to the bottom; then the hill rises, and they go down together."

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FRUIT-GROWING ON MARS.

JULY 12, 1869.

Sherman's fourteenth examination.

"I am in a house now. Why! they make improvements twice as fast as we do. I see a great deal better things than I did before (1). They have flies that bite, and they have things to kill them. They have windows with hinges at the bottom. They are let back by a rope over a pulley. They open the windows and let the insects in, and then have a gum-elastic bag that is stretched out as large as the room. Something in the inside attracts the insects; then they let the sides go together, and it kills every one.

"They have a splendid way to grow trees so that insects will not get to them. They put the dirt through sieves to get the stones out. Then they examine it carefully to see that there are no insects in it. They have great basins of wood like wooden bowls, as much as twelve feet across. They set them in the ground, and set the trees in them. On the edge of the bowl, all round, wire is placed, and drawn over the tree so as to make a wire net. Then there are little doors, so that the people can go in and out. The leaves on the trees are nearly all perfect; and the fruit grows full size, and gets ripe. No gnarly fruit there. The wire is very fine. I do not believe an ant could get through it.

"They have a good way of killing plants they don't want. They use a white powder that looks like flour, which they sprinkle on them, and they die down.

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They die even when it comes within two inches of them.

"They have an excellent way of making soil. I see them crushing mud and sand between wooden rollers attached to a water-wheel, that reduces them to powder, just right for putting on their plants. All the leaves on the trees have the same chance, and all the fruits; so that they are nearly all ripe at the same time.

"They are very careful not to bruise the fruit. They put something like cotton into all the baskets, and round all the fruits, so that they don't touch each other. They have a long forked pole to lift them off the trees. They spread soft stuff on the ground, so that they will not be injured when they fall.

"They keep fruit all winter in large vessels made of iron, very thick. After they suck the air out with machines, they are bent in, thick as they are. The vessels hold four or five bushels. It is a little thing on the top that sucks the air out, and stops when it is done. It goes up and down like a small walking-beam of a steamboat. I can hear it go, and the air come out. They carry the vessels more carefully after this is done (2).

"They have a large white fruit, nearly as white as snow, and as large round as the top of a peck-measure. It is delicious. There is yellow and pink inside; but it is perfectly white outside. They are very particular about growing and preserving this.

"They have a small fruit, about as large as a huckleberry, that grows in great abundance; and they pick them with a machine that does not damage the

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leaf. There are two handles to it; and it works so that the air draws the fruit off, and the leaves stay on."

(1.) As he did not observe them before, he seems to have supposed that they did not exist.

(2.) It does not seem improbable that fruit could be kept fresh considerably longer if placed in stout vessels, and the air exhausted.

UTILIZING ELECTRICITY ON MARS.

JULY 23, 1869.

Sherman's fifteenth examination.

"I see many kinds of animals that they have caged near a river. They have one that is a good worker. They belong to certain districts. There are about three hundred in this district, and any man can use them that needs; but he cannot get them out of his district. The animal is about twice as large as a horse. They have more than are needed at one time.

"They have a good way of killing weeds. They have a thin knife about ten feet long, and ten feet wide. It is made to go under the plants, and cut them in two, a little below the surface; and then they die. They use that animal to make it go. They have small ones.

"Oh! almost every man has a place in his house for the lightning to strike. It goes up about twice as high as his house. It is made of iron, is hollow, and has a wheel at the bottom, which turns when the lightning strikes it.

"I declare! I don't see how they do this; but they keep the electricity in some way, and it shoots up

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from the top of this conductor like a large ball. It seems as if they made some use of it. There is machinery inside of the conductor, and it is ornamented so as to look beautiful. I can see cog-wheels and bands. It is all fixed in a mechanical way. Those balls shoot up so far, one can barely see them.

"The conductor keeps drawing the lightning down out of the clouds. Sometimes ten or eleven discharges follow each other about a minute apart. Almost always one or two sparks fly out before the discharge. It jars the ground when it strikes."

LOCOMOTION AND BATHING ON MARS.

AUG. 19, 1869.

Sherman's sixteenth examination.

It was cloudy; but he found little difficulty, as he said, in passing through the clouds and to the planet.

"Oh! I am where those people are that have cross-eyes like cats' eyes, and that have three fingers and a thumb. I see many new things here. They have soft clothes. They are very honest people.

"They have hats made of green stuff, as large as umbrellas; so that they walk in the shade all the time. When it rains, they can just sit down and let the rain run off. They have the same kind of money as the people on the other side, — those I saw before.

"I see a machine the people have for riding around. It is so easy! It is no expense at all. They wind them up with a machine. They work with both hands. Then they get in and touch a spring, and go for an hour (1). They can steer it very easily. A great many can ride in one. I see as many as two hundred

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in one. The car is near the wheels. They come up inside the car. The road is laid with stones, smooth. The wheel is rounded, and the car is very light. It is made of that light metal. There are small ones that carry one or two. They go as fast as a freight-train. The man that steers winds them up. How quickly they turn!

"Every ten days they have great picnics. Every tenth day is like our Sunday; only they make it a day of pleasure. They have great times.

"Their hats look so curious! They stick to their heads like wet leather to a stone, and the wind cannot blow them off. Both men and women wear pants. I think the women look a great deal better there than they do here. You could lift a man up by the two sides of his hat. They lift them up at the front when they want to take them off.

"These people have curious things for learning to swim with. Everybody learns, and swims. When learning, they have flat boards they lie on, that are buckled round them, just sufficient to keep them up. They have regular swimming picnics. They are a very healthy people.

"They have things, also made of wire, just so deep, fixed with pulleys, so that they can lower them into the deep water to the right depth for the little fellows to swim in. They have things on their hands too,— heavy things to practise with; and then they can do better when they are off.

"There are men wading on stilts eight feet high: and, just at the water-level, there are flat things; so that they look as if they were walking on the water.

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They dive with them on too. This water is salt. There are great seaweeds in it. They dive down for pebbles and other things just for their beauty.

"I see poles stuck in the mud, with troughs on top, in which the learners can lie and practise just under the water.

"Some women swim splendidly. They go away out. They do not wear any bathing-dresses. Men and women all bathe together. They look like the people here, — all but their eyes and fingers and toes.

"Some of them have hollow things belted round them, thick in front, and thinning out to the back.

"The water is very warm. The air has a temperature of eighty-three degrees, and the water about sixty-six degrees. The sun is shining."

(1.) The winding-up was probably connected with some apparatus that he did not see for generating the power that propelled the machine. It would require a steam-engine to wind up a spring that could move a car with a load of two hundred persons in it, even if they weighed no more than they would on Mars.

HOUSE-BUILDING ON MARS.

AUG. 20, 1869.

Sherman's seventeenth examination.

It was cloudy again to-night.

"I see the same people working very hard. They use those travelling-machines to carry lumber and things generally.

"They are making things. They have such curious tools! They even bore large holes at the bottom of small ones in that soft metal. They do it with a

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spring in a drill. When the hole is so deep, they touch a spring that lets the cutter out, and it makes a larger hole. When they want to get the drill out, they pull a piece out of the centre, and out it comes. They have these drills of all sizes.

"They make their houses in a very curious way. They do not make them with a frame like ours. I see a house now that they are building. It has eight corners. They first put up a solid pillar of that light metal in the centre, as high as they intend the house to go; and from it they fasten on others: and they reach across on each side, so as to make ribs to eight corners; and they make the sides from those corners. Below, it is all framed with this light metal, and finished on the outside with sheets of the metal, that last a long time. They can make and finish a splendid house in a week (1).

"It is nearly all made of this metal. On the ground is a frame, and pillars from each corner down to this, and fastened. The walls of the rooms are made of that metal, and polished. It is very beautiful, and looks like agate (2).

"They have very nice material for warm weather. Clothes made of it cannot be heated. It is always cool. It looks glossy, and is as soft as silk. It cannot be burned, and it puts out fire when it is put upon it."

(1). He probably meant that they could put it together in a week, the material being all prepared beforehand.

(2.) Such a house as he describes could neither be blown down, thrown down, nor burned down; and, in earthquake regions, would be invaluable.

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BEASTS OF BURDEN ON MARS.

Sherman's eighteenth examination.

The following paper was written out by Sherman in August, I think; but the date was not attached to it.

"I am in a beautiful city, where everybody seems busy.

"Now I am where the flying-machines are.

"There are animals here like elephants; only they have no trunks. There are a great many kinds of trees, and some like the palm. These animals are very gentle, though they do not look so. The people use them for taking them about. They feed on the fruit of this palm, and live near the water. They are used instead of horses. On some of them there are beautiful fixtures to ride in.

"There are large telescopes here, so good that the people can see a man in our world. They are looking at our velocipedes, and laughing."

In answer to questions, he said that the telescope was small at one end, but large enough to see with both eyes; and, at the other end, as large as a room. It was two or three hundred feet long. Inside of it there were very clear glasses. It was placed on a large tower.

SILK-WORMS ON MARS.

SEPT. 12, 1869.

Sherman's nineteenth examination.

"I am in a place where the people are making something that will burn, and give light for a great

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while. It is something that they get out of the ground. A piece an inch long will burn for an hour.

"They have a kind of worm here that they kill before it spins, and then put the inside into a sort of machine, and draw it out into a kind of thread. The worm is about six inches long.

"Some of the silk is blue; and some looks clear, like catgut. I think one is from the male, and the other from the female. That thread is what the clothes are made of that I saw spun by machinery the other night.

"At a certain size they give the worms no more to eat; and they turn black, and die. The skin peels off when it gets hard and crusty. The inside looks very pretty. They unite a great many together, and make very long threads (1).

"The worm feeds on a leaf about the size of a broad-brimmed Panama, that grows on a high bush.

"They let a few spin cocoons to raise eggs. The cocoons are a very long oval. The same moth lays eggs that produce both kinds. They can take the blue color out."

(1.) Out of the common silk-worm of our planet, there is, I find, a material produced, called silk-worm-gut, used by anglers for dressing the hook-end of the fishing-line, and also made into violin-strings. When the worms are about to spin, they are immersed for about twelve hours in strong vinegar. The operator then lays hold of one end of the silky material which is seen in the silk-glands, attaches it to the edge of a board, and stretches the material till

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the other end reaches the other edge of the board, where it is attached, and then left to dry.*

EXAMINATIONS OF MARS BY ANNE DENTON CRIDGE.

Being very desirous of testing these wonderful statements by independent examinations, early in May, 1869, I wrote to Washington, requesting my sister, Mrs. Cridge, to examine Mars, and let me know the result. I received a letter a few days afterwards from Mr. Cridge, stating that an astronomical friend had pointed out the planet, and that Mrs. Cridge would commence the examination as soon as the weather was warm enough to enable her to be "entirely negative, and not shiver." Nothing was written with regard to what Sherman had seen, so that the experiment might be a test one.

The examinations were not made till July. I give them just as they came to me, written by my brother-in-law at the time they were made, with the exception of the headings and a very few verbal corrections. No thought has been changed or left out, and nothing added.

THE LIGHT OF MARS.

JULY 20, 1869.

Mrs. Cridge's first examination.

"Now I can see Mars as distinctly with my eyes closed as when they are open. There is a peculiar sensation, as if I moved to the planet, or the planet came nearer to me.

* Chambers's Encyclopædia, art. "Silkworm-Gut."

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"For an instant, — only for an instant, — I feel myself face to face with the planet; yet it appears no larger than it does to the naked eye. That sensation is gone; and, as quick as a flash of lightning, I find myself hovering in space. I look up, and, lo! a world on my left and on my right. Encircling this world is a ruddy atmosphere. How still it is! I look up at the clouds, and wonder as to the cause of the rosy hue. The very air is impregnated with the causes from which are eliminated the hues of the rosy curtain which envelops this world. It is entirely unlike any thing I have ever seen, except the peculiar light which is sometimes seen of a summer evening, when the western sky is lighted up with red, and the very light appears red and soft to the eye; for about the atmosphere of Mars there is a peculiar softness in regard to the transmission of light.

"As I observe this peculiarity of the atmosphere, I notice that the planet is moving around its axis. I catch the outlines of the land and water; but I am so interested in this atmospheric peculiarity, that I would like to become satisfied as to its cause. One cause, I think (though I may hereafter find, when I come to analyze the planet itself, that I am mistaken), is a peculiarity of the matter composing the globe of Mars; for I find here, as I rest between the globe and its envelope, that there is a chemical action constantly going on between the light which comes through its atmosphere and the matter of which the planet itself is composed.

"I feel like an infant born into a world of which he knows nothing; for here are causes at work con-

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cerning the adjustment of which I am entirely ignorant. Now I look more closely into the nature of this atmospheric peculiarity, and realize the beautiful play of an electrical agent. The sensation derived is one of vigor and elasticity. There is a feeling of life-giving power that I have never experienced from the atmosphere of our earth.

"And all this is to me so new and wonderful, that I find myself speculating and philosophizing; and so the psychometric condition is broken."

THE ATMOSPHERE OF MARS.

JULY, 1869.

Mrs. Cridge's second examination.

"The character of the atmosphere is to me so wonderful, and I find myself so interested in ascertaining its nature, that I am held, as it were, within it.

"There is a peculiar sensation of *life* in this atmosphere, — a life-giving agency.

"I perceive that the particles which give this peculiar tint to the light are globular and rosy, having the appearance of lightning, and electrical in their character. They are in motion, alternately attracted to and thrown off from the planet to and fro, yet not so disturbing the atmosphere as to make this motion perceptible to the *physical* senses, were we there bodily. I realize this state of things psychometrically. The other ingredients of the atmosphere of Mars are colorless, like those of our own.

"Though the atmosphere is denser, heavier, than that of the earth, it has more life in it, and is remarkably clear.

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"Psychometrically I am impressed, that, at one period, the planet itself reached the limits of its present atmosphere; and I feel clearly that the atmosphere has been *born of the planet*, and is a part of it, its peculiarities belonging to the planet as a base. The light of the sun comes there in contact with different gases, natural forces, and conditions, from what it does here: hence the atmospheric result.

"If there be any inhabitants on this planet, I think that they must, by reason of their superior atmosphere, enjoy life much more than we do. There is a sense of travelling through a strange land in journeying through this atmosphere, and one feels curious to know what kind of a country it can be; but it is impossible to speculate. I long to set foot on the soil."

PHYSICAL GEOGRAPHY OF MARS.

JULY 27, 1869.

Mrs. Cridge's third examination.

"At last I am on the planet. I find myself on a very high mountain, volcanic in origin, which ascends miles into the atmosphere. I thought that probably the foliage would be red, and that I should find red everywhere; but, on looking down into the valleys, I realize greenness and blueness, as well as the ever-pervading redness in the atmosphere.

"I want to look at the rock under my feet of which this mountain is composed. How high this mountain is! I could never get down were I in such a place. I want to psychometrize the rock. I realize the sphere of iron, but not much of it. There are also precious metals, but not in large quantities: what there

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are are closely incorporated with the rock. To the eye the rock appears like crystallized quartz.

"What a queer world this is! What immensely high mountains! What valleys! Between the point on which I stand, and another mountain to the west, sleeps one of the most undisturbed valleys of which the imagination ever dreamed. And the shrubbery, — there is vegetation — is green. From the point whereon I stand, the greater part of it is dark green in color; but away over yonder, north by west, where the sun is shining, it is light green; still farther north, there is a bluish appearance like water. I want to go north." (A pause.)

"Now I come back again to the mountains. I would like to go to the pole, but cannot travel that distance to-night. What tufty trees, — baby trees! What strange and curious forms! What does it mean? What are they? They look like large mushrooms, thick stalks, as large as the trunks of our ordinary-sized trees. There is, however, an approach to the leafy form about them in the direction of the veins; so that, at a distance, they have the appearance of trees. There are quantities of low vegetation, which, at a casual glance, resembles moss; but how very dense the undergrowth! Should I step on it with my physical feet, I should, it appears to me, become buried in the mass, living and decayed.

"Though the atmosphere is so dense, yet there is such a sensation of elasticity, that, could I be transported bodily to the planet, I should find motion so easy and rapid, that I could imagine myself to move in the air by will-power. My body has the sense of

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flying. I have the sense of being there bodily, and I feel as if floating with a kind of wavy motion. The attraction of gravitation is not nearly as great as on the earth.

"I had a passing impression of inhabitants, who were, I think, chunky, and short in stature. I took, however, no particular notice, being mainly interested in the *natural* characteristics of the planet."

PHYSICAL GEOGRAPHY OF MARS CONTINUED.

AUG. 1, 1869.

Mrs. Cridge's fourth examination.

"I look from the same point as before, — a very high peak; and, as I look across to the twin-mountain before mentioned, I perceive it to be so distant, that it appears like looking from the extreme verge of one continent on one side to the extreme verge of the continent on the opposite side.

"There is the valley, — the deep, deep, dark-green valley, — in much the same shadow as when I last saw it. The sun, however, reaches in it a little farther to the southward, glancing in from the westward; and far away to the north and west is the break before mentioned, where I catch an outline of water or snow.

"As I rest here to-night on this mountain, I feel a thousand influences, and I am drawn in as many directions." (A long pause.)

"I find myself standing on the shore of an ocean; and the water ebbs and flows. I put my hand in the water. It is of aqueous character, but not like our water. It makes a curious noise as it rolls to the shore. It does not break and splash like ours. It has

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within itself a peculiarity that attracts it to the planet, — a sort of adhesiveness, or perhaps electrical attraction to the body of the planet. It is more buoyant, can sustain a greater weight, than ours. It is transparent, and has a peculiar sparkling appearance when lifted up and held before the light. I observe, too, that it is greatly charged with similar globules to those that are in the atmosphere. They are electrical.

"Oh, I want to notice, examine, and analyze so many things! I want to psychometrize the water, and ascertain the materials of its composition, and wherein they differ from our water. I should like to look down through the earth on which I stand, and the ground over which the ocean rolls. I should like to analyze the imponderables in all these. And with all this there comes a sense of weariness from the realization of a new world and new surroundings.

"The shore or point on which I stand is south-westerly from both these high mountains, on one of which I stood. I *see* no inhabitants, though I know there are some; but I am more attracted to inanimate nature.

"There is ice in this world. I see it in that break which I mentioned as having seen from the mountain, and which is northerly from the mountain. I catch a glimpse of this ice, and see it extending over the waters as it freezes."

REPTILES ON MARS.

AUG. 8, 1869.

Mrs. Cridge's fifth examination.

"I stand on the same mountain as before, but not so far up. I have looked so often into the valley that

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lies away down, — down in such perilous depths, — that whereas, at first, every thing appeared indistinct and shapeless, I am now enabled to examine things more calmly. I do not feel in a hurry to-night.

"I catch a glimpse of huge reptiles in the valley, crawling amid the dense underbrush and accumulations of decayed vegetables that lie in immense depths. A stream of water runs through this valley; but it is so concealed by this *débris* and underwood, and it is so dark-looking down there (for the sun never shines in it), that it is no wonder I did not observe the stream when I came first.

"I feel as if I were two individualities almost, one of which stands some distance down from the high peak from which I looked first; while there is another self — a consciousness — that goes down into the valley, like a psychometric power within a psychometric power. And so I climb up the immense *wall* which bounds the valley on this side.

"I see mosses and vegetation; but I cannot stop long enough to observe them in detail. In a similar manner, I also catch glimpses of huge animals resembling crocodiles or alligators. I only see their heads occasionally. I don't know what they are like in regard to the details of anatomical construction, or the class of animals to which they appertain; but they look huge and monstrous.

"This peculiar element, — gas, or whatever it may be, — that imparts the peculiar ruddiness to the atmosphere, I find not only in the atmosphere itself, but in all water: and, indeed, it seems to be a component part of almost every thing there, so far as I have gone;

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being as necessary to the planet and all its appurtenances as our air and water are to the earth and its inhabitants. It is correlated with every thing, forms a counterbalance to the seeming lack of attractive force in the planet itself, linking all things together, so that every thing is held by this element.

"On the present occasion, as also on the last, I caught a glimpse of the other hemisphere of the planet, now turned from the earth. It is a beautiful region, apparently well adapted to human habitation."

PECULIAR ELECTRIC CONDITION OF MARS.

AUG. 10, 1869.

Mrs. Cridge's sixth examination.

"I look to-night on the south-east side of the mountain. Down, down, down it descends, in a south-south-east direction, until a body of water reaches to the land, of which the mountain forms a part. This water is a very large body: it extends for a long distance east and west; reaching also to the south pole, and all around it, except at one part, where it is broken by a group of islands; which group, at one period, was united and linked with that continent, of which the deep, dark valley forms a part.

"I see the indentations which the water has made on the land as it fringes the shore. This part of Mars is very pretty: it appears exceedingly pretty. From this high point of rock I can scan the whole. How small it seems! How small the whole globe seems! — such a short distance from pole to pole! It is warmer than I expected to find it, the red appearance (or the cause of it) giving warmth as well as light. And

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though, there as here, the climate varies according to latitude, it is much warmer than its distance from the sun would lead us to suppose. It has within itself an electric battery, as it were, which, by its pulsations, causes a peculiar electrical condition of the whole planet, inducing warmth, as well as the peculiarity of redness in the atmosphere.

"To the north of the *eastern* continent (considering the mountain, deep valley, &c., as being a portion of the *western*) I see a volcano. It is smoking now. It is night on this (eastern) side.

"This planet has been subjected to excessive volcanic action. There are evidences of volcanoes in thousands of places, as if the whole planet — on this (eastern) side especially — had boiled at some time, and thrown up small craters. From a distance, they have the appearance of so many pyramids. The material which has been thrown out (lava) is now of a whitish-yellow color. They have been active at a period comparatively recent, speaking geologically.

"The land of this eastern continent is peculiar in its form. Regarding it from the high mountain, it is low at first on the southern shore, and rises gradually to the north and east in the form of an amphitheatre. There are fine rolling hills and plateaus, with thousands of those projections, or craters, forming a sort of ring, or border, around the amphitheatre. They are so white, and so similar in appearance, that they form a very curious and pretty background to the picture. They stand like so many sentinels, guarding the beautifully-undulating valley below.

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"But still farther eastward, and beyond all this, I catch the outline of a beautiful country. I see vegetation, trees, — oh, so dense!

"Thus I linger with inanimate nature, though I would like to reach down to the animated portion.

"There is a peculiar sense of the smallness of this planet. I think that its specific gravity must be less than that of the earth.* I am very confident that it is older; though I cannot tell *why* I think so, further than that something in its nature gives me that impression. There are less metals, proportionally, in Mars, than on the earth. The rocks, generally, are lighter and more porous; and in the very centre there are immense cavities, giving it something of the character of a bubble, but not much. It is not, however, solid or fluid throughout. There have been consuming fires within that have burned themselves out."

A PUBLIC PARK ON MARS.

AUG. 17, 1869.

Mrs. Cridge's seventh examination.

"Now I see the eastern continent just as before. The darkness clears off slowly; and I stand on what is like public ground, laid out somewhat labyrinthical. In the centre is a very large vase, carved out of stone, ornamented on the outside, in high relief, with what, in the lower portion of the vase, resembles cactus-stems, curving outward and upward, and terminating in animal heads. The centre of the vase is filled with earth.

* In the proportion of 95 to 100. — A. C.

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"This place, I see, is intended for a public garden, or park; but it does not at present fulfil that use, as it is winter in this portion of the planet. I see the trees in this park, but only the outlines, as there is no foliage."

(At this point there was an interruption of some minutes from external causes.)

"I see a beautiful city. It is laid out in *triangles*, two of them forming a square. Some of the triangles are entirely occupied by one large building; others by a number of houses.

"The sphere of every thing here is very pure. The people are very neat and clean. They are somewhat short in stature. Walking is performed by them with the greatest ease.

"All this is very dimly seen."

THE PEOPLE OF MARS.

AUG. 19, 1869.

Mrs. Cridge's eighth examination.

"I am again in the city mentioned in my last examination. I see the people sitting at the doors of their houses. There are rich and poor in this city. I examine the individuals. At first sight, they appear to be of the same race as ourselves. They wear clothing, eat, live in houses, &c.; but, on a further examination, marked differences are perceived. The pale color of our skin gives place, in them, to a most beautiful *pink*. Their hair varies in color from black, through various shades, to red; the latter color, however, being the most common by far. They have not only a circulation like ours, but, in addition, an

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electrical circulation, focalizing in that part of the brain which lies between the organs of firmness and veneration. Their heads are high, and, I think, superior to the average Caucasian head in the development of the intellectual, moral, and spiritual organs. I need, however, to make further examinations before I can be certain on this point. There is, however, in their minds, a decided outlook towards a Supreme Being. Their philosophy, as well as their intuitional faculties, points in that direction. I think they have more spirituality than we have.

"Our hair is electrical, but theirs is very much more so. We should be astonished could we feel with our physical senses the amount of electricity which it contains. Their will, like ours, operates on their muscles in order to produce motion; but their will further acts simultaneously on that *electrical* circulation which I have mentioned, whereby their motions are greatly facilitated. This, in connection with the much-diminished attraction of gravitation on that planet, renders walking so easy and delightful, as to seem like floating in the air as compared with ours. They walk and run in the same manner as we do, with the preceding difference as to the amount of exertion required, &c.; but they have, in connection with this lightness and electric force, a species of locomotion which is to us entirely unknown. It is a power by which, merely touching the earth with their feet from time to time, they acquire an undulatory or wave-like motion, which sends them to a considerable distance, in wave-like curves, from one point to another. On again touching the earth with their feet,

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the motion is repeated. This method of locomotion is to them very delightful, and much practised. It requires more muscular exertion, however, than their walking. They get up excursions, in which this method of half flying, as it may be considered, is practised by numbers of persons in company. One of the first signs of old age is the diminution, followed by loss, of this power. Afterwards the sense of lightness in walking is also diminished.

"How like logs we should seem to them! — so bound to the earth!

"They have learned to make glass. I see a large circular dome of glass, of very great height, in which are grown numbers of beautiful plants and trees. It is in the centre of a large piece of ground, which is, apparently, a botanical or public garden. In this garden are also numerous trees and plants.

"In the south-western portion of the Western hemisphere, approaching in that direction to the verge of the Eastern, on a large tongue of land jutting out into the sea, — something like Southern Africa, but smaller, in the southern hemisphere, but not near the south pole,* — I see a race of men who are almost black, their bodies nearly covered with dark hair. They are very small in stature; and their heads are small, even in proportion to their small bodies. They do not live in houses. They are the most inferior race of human beings I have yet seen.

* See Secchi Continent, — map of Mars, p. 266.

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THE DWELLINGS ON MARS.

AUG. 27, 1869.

Mrs. Cridge's ninth examination.

"I am in the suburbs of the city I have previously visited. I see some animals at a distance that are of a beautiful cream-color, the head resembling that of a camel. They are on a hill.

"It is not a large city, but beautifully intermixed with the country. The ground just here where I stand being somewhat higher than some portion of the city, I have a rather general view of it. I have seen no architectural work on the earth that equals that of those houses: they appear like dense vegetation assuming the form of houses Near to where I stand are three or four dwellings or cottages surrounded by gardens." (A long pause.)

"Those dwellings are covered by creeping, tasselling, clustering vines, with here and there branches of trees just visible among the profusion. I once in the United States saw something, the roots of which had been brought from Europe, which hung in tasselly clusters. Among these vines I see something of that appearance; only these are more definite and richer. Sculpture is poor and coarse in comparison with them" (A long pause.)

"I have been admiring with astonishment those cottages. I think, however, that, notwithstanding the *form* of foliage, the material is stone; and it has not been carved or hewn in these vegetable forms, but is the result of some subtle agency of Nature, the character of which I am at present unable to state.

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"Those cottages have glass windows, which project something as windows do in French roofs; but the glass portion comes to a point at the top, and is rounded below and at the sides, as if a pear were bisected longitudinally. The external appearance of the windows is very pretty. There is but *one* story.

"Their fences are composed of the same material as those vine-like appearances which I have described. In form they remind one of branches of trees covered with moss and other parasitical vegetation: yet, even in the most delicate portions, the material is hard; and they are all of tints varying in color as the rocks vary with us. I notice drabs, browns, and lead-color in various shades, quiet colors predominating.

"Now I find myself in the heart of the city, if that can be so called which seems all like a beautiful country. In one of the triangular divisions which I have mentioned in a previous visit is a large mansion of *two* stories, the first of which stands out several feet beyond the second, leaving on the top a kind of terrace. The first story is very lofty. There are many of those peculiarly-shaped windows, both above and below. On the top of the house is what may be termed a cupola, for want of a better name. It is supported by pillars, but is much larger in proportion to the building than cupolas are on the earth. It forms a beautiful addition to the building, and is more a *part* of it than the word "cupola" indicates. Looking at the building from the surface of the ground, the upper portion has a very fine appearance, being so large, and yet in harmony with the story below, giving a terrace-like appearance to the latter.

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"The building is polygonal in ground-plan. I do not know *how many* sides, — probably eight or more; but I have not seen it all around so as to count the sides, which, however, appear to be all of equal size. On each side are two bulged walls, each formed of *eight* equal sides, instead of being circular or curved. In those bulged portions are the windows, above and below. I should like to go around the building; but I cannot. I see, however, that it is polygonal.

"So much for the form: now for the material.

"As I stand here regarding it, delighted at its marvellous beauty, I observe that it is composed of the same material as those suburban cottages: but, though they were quite pretty, I realize, by comparing them with this building, that they would merely represent *uncultivated* taste; while this, in every particular, expresses the fine stand most delicate culture. The whole building is adorned by something in the *form* of vegetation, arranged in the most perfect expression of ideality, — trailing vines, cup-like flowers, the small, the delicate, the exquisite, duly combined with the larger and bolder. And yet, when touched, I feel that it is all hard, like stone. I go to the cupola; but, when here, it reminds me of a most exquisite summer-house covered with trailing vines; and, when I look up to its inner roof, I find it to be formed of one large, beautiful leaf, surrounded by vines and flowers. Yet *all is stone*, having all the quiet, delicate variety of coloring that the rocks have; browns, lead-color, drabs, &c., predominating. It is as if Nature had here elaborated in stone all that on the earth she has elaborated in vegetation; in short, had immortalized herself in petrifactions.

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"Though I do not distinctly see the people, I can psychometrize the eye, in the pupil of which is a peculiarity due principally to the electrical circulation in themselves and to the atmospheric conditions before mentioned. It is this: The pupil is formed of a *many-sided lens*, enabling them to see more from the *side* than we can, and giving to the eye a pleasing expression. I am unable to describe this more minutely for want of sufficient optical knowledge, as well as from insufficient opportunity to examine further.

"The convolutions of their brains are also very different from ours. Their brain is divided into six compartments, the two posterior being partially united. I need, however, to make a more detailed examination in order to convey a clear idea. They have senses like ours; but an electrical sense is super-added, — something recognized by them as a part of themselves more than is the electrical element with us.

"Now I look into a building where there is machinery in operation, electricity being the motive-power. How smoothly and silently it moves, just like the operations of Nature!"

INTERIOR OF THE DWELLINGS ON MARS.

AUG. 27, 1869.

Mrs. Cridge's tenth examination.

"I am now inside of the large house, the outside of which I described in my last.

"The walls are of extraordinary beauty, being inlaid with pearl and a variety of beautiful colors, and highly polished. Here and there are large mirrors,

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the spaces between which are covered with this exquisite and intricate work, which is perfectly smooth, being inlaid in the wall itself. Where our walls would be bare, they are here covered with this inlaid work, which resembles beautiful flowers, purple and green predominating. I never saw any thing so perfectly beautiful.

"I am in a large room on the south side of the house; and on the west side of the room is a large mirror, reaching almost to the top, on each side of which are white pillars resembling the finest alabaster. At the top the mirror is let into the wall several inches. On each side of it, near the top, is a representation of a beautiful bird, the predominant colors of which are purple and gold. Each bird holds in its mouth grains made of gold.

"There are several mirrors here, some of which are larger than this one; but, for some reason unknown, I am attracted to this one.

"As I stand, I see the reflection of myself in the mirror. The windows are open, and reach to the ground. Instead of lace curtains, they are adorned by resemblances of vines and other plants, interlaced, and drooping about the windows. The material of which they are formed is similar to that composing the birds and the inlaid ornaments between the mirrors: it is not, however, of the same nature as that composing the stony *exterior* ornaments, but is *manufactured*, the ornaments being of the most exquisite workmanship.

"The interior arrangements of the building enable several of those magnificent rooms to be thrown, when

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required, into one apartment. The walls, which may be considered as double, then are made to form pillars. They do not, however, convey any impression of massiveness, being so very light, owing to the diminished action of gravity in this planet as compared with ours, and from the adaptation of all matter to that condition; also, still more, owing to the superabundance of electricity.

"Of the people I occasionally catch glimpses; but I am not yet in the condition for *human* psychometry, feeling more linked with the inanimate. I hear the people talking: I hear the sounds, but know not the language. They write; and the written characters are very peculiar.

"Now I am in the garden. I see a small body of water, which may be a pond or artificial lake. It appears heavier than our water. I cannot more particularly describe it. I now see only *parts* of things."

(At this point the planet had almost set, and was nearly invisible.)

BUILDING-MATERIAL ON MARS.

SEPT. 10, 1869.

Mrs. Cridge's eleventh examination.

"I am again in the outskirts of that city. I see there broad roads and hedges; and, in the city, streets and sidewalks.

"They ride in vehicles. I see one that is double-seated; the back seat being much higher than the front, giving it a curious and rather pretty appearance. Those vehicles are drawn by animals.

"In this city they have sewers and water-pipes.

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And now I see that their water and ours is composed of the same gaseous elements; but theirs has an additional ingredient.

"This and other things I perceived before, but only dimly, as I can imagine an infant may at first see things, — vaguely, and in snatches. But now I feel more accustomed to the light and the atmosphere, though there is not yet all the distinctness that I could wish.

"The foliated stone, which I have before described as ornamenting the buildings, is *manufactured* very easily and very rapidly. The rock, which is the raw material, is first brought into a fluid condition, and then, by mechanical agency, forced into moulds, and removed as fast as it cools. I can see them at work making it. In one part of the building I see the rock in a fluid condition; yet I do not see distinctly; or, rather, I see distinctly *that at which I am now looking*, but all outside is shut out in darkness: the *field of view* is narrow. I visit places, or *portions* of places, as we might visit places here, seeing only that at which we are intently looking. I see, too, only with untutored eyes, as one might see, if, being ignorant of the nature of machinery or the principles of mechanical construction, he should go into a machine-shop, and observe the operations there in progress.

"I saw the fluid rock pass through openings in a partition or wall, and into moulds, which were suddenly cooled by a bath of water. A number of men were at work removing the material from the moulds as rapidly as it cooled; and so exactly was the machinery constructed, that, with the precision of the

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pendulum, the material was placed in the moulds, the moulds opened, and the castings transferred to long, broad, shelf-like receivers. The whole motive-power is electricity, and comes from an apparatus not larger than a blacksmith's bellows; and the electricity therein generated is introduced into the rock by means of iron or steel pipes welded together; and I see numerous apertures by which the electricity, as separated from the air, is introduced.

"There are here poor and rich, workers and drones: there is, too, an inferior class, or race. I cannot tell *how* I know this; but I *do* know it."

DIFFERENCE BETWEEN THE PEOPLE OF MARS AND THOSE OF THE EARTH.

SEPT. 13, 1869.

Mrs. Cridge's twelfth examination.

"The countenance of those people about the lower part of the face is dish-shaped. The iris of the eye seems to have six points, and presents the appearance of a many-sided lens. The expression of the face and its curves harmonizes with the expression of the eye, giving a bright, animated appearance to the countenance. The eye is better adapted to the peculiar atmosphere of the planet than our eyes would be, to which the highly electrical atmosphere of Mars would be very painful, and would soon produce blindness; while the inhabitants of Mars, if here, would scarcely be able to see at all.

"The skull is thin. The usual form of the head is high; but the tendency now is to greater width in the coronal region than there has been. They live

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longer than we do; are less *intense*, and less easily exhausted by mental labor. The electrical part of their constitution (which is to be regarded as an *addition* to that constitution which they possess in common with us) tends to preservation of the tissues, and to the diminution of wear and tear. Their arms are proportionally longer, and their feet and hands proportionally larger, than ours. In the floating movement previously described, every muscle of the feet and hands is brought into play: the increased size of those organs, therefore, indicates a correlation with the external conditions of the planet.

"I see no *new* mental faculties, no phrenological developments not common to the inhabitants of both worlds. I observe that every organ of their brain is phrenologically identical with corresponding organs of ours. The lobes of the brain are the same; but the *medulla oblongata* is much larger in their brain than in ours. Were we to dissect such a brain, it would be said that the *nervous centres were double the usual size*. This medulla oblongata is the *battery* for the production of the electrical material or fluid which circulates in their systems, having its correlation or correspondence in the atmosphere.

"This atmosphere is exceedingly clear and transparent; and their eyes, by reason of their electrical light, can pierce much farther than ours. There is something about the whole countenance markedly different from ours; and yet so like are they, that I feel they are one with us, and that we are both travelling in our little barks around the common centre, — the sun."

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LARGE MUSICAL INSTRUMENT ON MARS.

SEPT. 17, 1869.

Mrs. Cridge's thirteenth examination.

"It is in the *iris* of the eye that those appearances of points are seen; yet they are not points in the nature of *projections;* but around them are dark shades constituting a modification of the *color* of the iris, or perhaps a deeper shade of the same color, against which those seeming points show as lights on a dark ground, giving a beautiful star-like appearance to the eye.

"In stating that their feet and hands are proportionally larger than ours, I should have added that they are thin in proportion to their length.

"Their speech is largely composed of vowels and liquids, and, in its general effect, much like Italian. In their writing they have word-characters; and they can write very rapidly. The following is a specimen of their characters: —

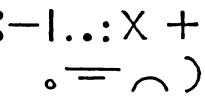

FIG. 105. — Word-characters.

"There are also a few dots and *o*'s appended, here and there, to the other signs.

"Their ink, which I now see, is of a deep indigo-blue color. The inkstand has an oblong, open receptacle at the top.

"I am in a large room, where a person is writing in characters like those of the preceding specimen.

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"And now I see a large musical instrument, having keys as in a piano, not only in front, but also at the sides, so that several persons can play on it at the same time. It is very long, and is beautiful in its appearance. As seen now, the back is against the wall; but it can readily be moved into the centre of a large room. There are also keys behind, so that persons can sit and play on that part. Sometimes as many as six persons play on it at once, when *all* the parts are open; and one or more parts can be open for playing, the others remaining closed.

"The keys are much like the white keys of the piano-forte; but, instead of the black keys, they have small keys raised above the others, which have *concave* surfaces, but are otherwise *let in* to the other keys similarly to the black keys of the piano-forte. They appear to be more convenient than our black keys. The people sing; and, when this instrument is played, it has a very fine, harmonious sound.

"The instrument is handsomely constructed: it is built of wood as a basis, the grain of which beautifully graduates from Vandyke brown to a delicate red, veined occasionally with light drab and Naples yellow. The instrument looks beautiful, whether open or closed, and has nothing of the box-like appearance of the piano. When closed, it is somewhat pyramidal in form; and, when open, has a similar but more extended form, the portions turned up in opening increasing and completing its beauty. From the top (which is some two or three feet above the keys) there is an opening down to the centre of the instrument.

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"Many of the details of its mechanism I could not clearly enough perceive to critically describe."

WORSHIP ON MARS.

SEPT. 19, 1869.

Mrs. Cridge's fourteenth examination.

"I am in the room in which I saw the musical instrument on the previous visit. The walls are nearly bare; that is, there is none of that beautiful inlaid work which I saw in another place. The walls are very smooth: if cemented, the cement looks much like smooth stone. Against them are astronomical representations. One, — very red, on a dark sky, — I suppose, represents Mars. Various other planets or stars are represented: one almost resembles a crescent moon. I do not understand these representations: but it is evident, from them and from other circumstances, that they know something about astronomy; and I notice that they observe the planetary system and the fixed stars. Some learned and scientific people have a purely scientific interest in the subject; while with others the organ of veneration is active in connection with those observations.

"They have large buildings in the form of the half of a prolate spheroid, with a top. In those buildings are representations of rather monstrous human forms, with which are connected astronomical representations. One of these human forms is a large figure made of glass, about thirty feet in height, holding in his hand a representation of a planet colored red, — Mars, I suppose. Those huge forms, however, appear small in comparison with the immense height of the building.

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"I see persons entering it, and I see them prostrate themselves on the ground before those huge forms. One of them, which may represent the sun, is composed of an alloy of copper with some gold: it is notched at the edges as the sun is represented sometimes. On a piece of something which is suspended over the head of another of those statues are fastened three small globes,* nearly equidistant from each other. Some of the statues have stars.

"In this building is a gallery, which does not go all the way round it, but leaves a space occupied by those statues, which, I suppose, must be gods."

* Mercury, Venus, and the Earth? I think they are nearly equidistant. A. C.

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MRS. DENTON'S EXAMINATIONS OF MARS. — GLIMPSE OF MARS.

MARCH 25, 1869.

First examination.

"This planet has considerable influence upon the earth; or, rather, they affect each other. I never noticed as much influence between any other two. There seems to be an intimate magnetic relation between them. The light of this planet affects me differently from any other light that I have noticed.

"I am unable to reach the planet; but I can perceive land and water. The atmosphere seems to have some different element in it from what there is in ours. Its influence resembles that which I have noticed in connection with mineral veins. I think the atmosphere must be hazy to an inhabitant of that planet.

"Now I obtain a glimpse of a structure. It is extensive, and very peculiar. There are many divissions in it, or rooms partly divided, so that persons can pass under; the partitions not reaching the floor. I think it is polygonal. Those divisions are merely curtains, I believe. It is three stories in height; both the second and third stories receding in circumference, leaving a broad terrace on each story below. The upper story has a dome-shaped covering of transparent material resembling our glass. Each terrace is covered with the same transparent material, which, with enormous windows on every side, supply the immense enclosure with abundant light and air."

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Some examinations were attempted after this; but conditions were unfavorable; and nothing more was done for more than four years.

NATURE AND ART ON MARS.

JUNE 10, 1873.

Mrs. Denton's second examination of Mars.

The following were all written out by Mrs. Denton from notes taken at the time the examinations were made: —

"I did not realize that I was moving from my place in this room: and yet I seem to see the Earth, Mars, and that star beyond (Spica in Virgo), as if they were balanced in space; though I do not see that which balances them.

"Now I see plants singular and beautiful: a gorgeous mass of foliage and bloom is everywhere before me. The appearance is that of tropical verdure, rank and rich, and as if springing from a soil moist and warm. There are plants resembling the fossil sigillaria. The many ribs of their thick, fleshy, light-green leaves, thin toward their edges into an almost satin tissue, with a purplish tinge of varying shades as they spread to the light. These leaves are very long and broad, and their foot-stalks are fluted to correspond with the fluted trunks of the plants.

"There are lilies of wonderful brilliancy, purity, thickness of petal, and size of blossom; vines with foliage of exquisite delicacy, and large but delicate bowl-shaped yellow flowers. There are also large plants with leaves springing directly from the root, and fully two feet in length. These are of a deep

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dark green; and from among them spring, also directly from the root, long flower-stalks, each terminating in a long raceme of fine bell-shaped flowers of bright red and pure white, beautifully threaded together.

"But I cannot describe half of the plants I see: they are mostly new to me, and exquisitely beautiful.

"Now I see a volcano and a long range of mountains. The scene is entirely changed, except that even these mountains are crowded with vegetation that is also new to me.

"Now, for the first time in this examination, I see works of art. They are buildings of peculiar design and elegant finish. Some of them are round, with jutting roof, forming a porch all around the building. One, comparatively small, has a tower of considerable height. This is square, both building and tower. But whatever the form, and however elaborate the style, all the parts and their finish are in such harmony as to evidence a refinement in architectural taste that is truly inspiring.

"I see a floor of white rock, which appears to be several hundred feet in length. I can see but one wall: whether there are more or not, I do not know. On this wall, which is of the same material as the floor, are elegant forms cut in relief, — plants and flowers. I think they must be the floor and wall designed for some vast building. There are chisellings in the floor; but I cannot understand the designs.

"Now I see figures cut in stone. An immensely long *beam* of stone has a vine running the entire length of it, bearing buds and large bowl-shaped

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flowers. I think it is a representation of the yellow flower that I saw on the vine; but, if so, the vine must grow to an immense size, as it is much larger here than as I saw it; or this is untrue to nature, which I can hardly believe, so natural and harmonious seems all that I have yet seen. I think this block, or *beam*, is intended as a cornice for some part of this building, if building it is. There is a great deal of work of this character about here.

"I see long polished marble slabs. The polish seems inimitable. Some of the marble is speckled, some waved and clouded, and some beautifully figured in what seem like varied forms of flowers. One long slab, or beam, is marked by all the beauty of the rose. The blushing petals, with all their clustered, shaded loveliness, gleam from that polished surface as from a perfect mirror. There is nothing I ever saw on this planet that can compare with it.

"I can see how these slabs are polished: it is done by something that is made to revolve on the upper surface, while the block or slab is gently moved along by machinery below. We know nothing of architecture compared with those people. We have no such material as they have to build with.

"I see a great deal of machinery in use here. It seems to do nearly every thing that is done.

"Those different kinds of marble are often used to form figures on buildings.

"I see a table made with open places for holding dishes. Each dish exactly fits its appropriate place. The table seems made of bands of some kind of metal, of steel-gray and gold colors.

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"That white rock is very extensively used. It looks as pure as crystal, but is not as clear."

HOMES AND HOME-LIFE ON MARS.

JUNE 11, 1873.

Mrs. Denton's third examination.

"I see immense buildings. They seem to be dwellings, and are large enough to be the homes of thousands of people. Almost every thing I see here appears to be on a magnificent scale. One of the buildings is four or five stories high, with turrets and towers, and various designs both for ornament and convenience, which altogether relieve what might otherwise prove a disagreeable monotony. This building is square; that is, it encloses a square, containing, I think, a full square mile, — perhaps a mile and a half. The lower portion is divided into sections; and between each section and the one adjoining is a wide arched way, or opening.

"In the centre of the land thus enclosed stands a large circular building, much higher than this which encloses it; and in it there appears to be performed by machinery, and with almost incomprehensible speed and ease, a vast amount of that labor so common to every household, and which, in our isolated homes, constitutes, for so many mothers, wives, and daughters, the drudgery of life.

"At the base of this central building a wide, revolving platform extends entirely around it. From this platform a track, or road, runs in a straight line to every archway referred to as between the various sections of the large square building; and over these

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roads any person residing in a given section passes at will to any other section by simply seating himself in the conveyance which passes to and from that platform at regular intervals of only a few moments each; then, stepping upon the platform until it revolves to the road corresponding to the section that he wishes to visit, he seats himself in a similar car, and is at his destination in a moment. These vehicles, or cars, are light and easy conveyances, but seem only intended for transit between these inner sections of the large square building.

"The grounds enclosed, and corresponding to these various sections, are, in most instances, divided into plats of green similar to our grass, and beds of choice and fragrant flowers of almost every conceivable form and shade. The sparkling spray from fountains of pure water washes the flowers, cools the air, and beautifies every thing around. There are here blossoming and fruit-bearing trees, and shrubs and arbors and shaded walks, and very, very much that is beautiful beyond description. Many of the trees and plants resemble those of the tropics of our own planet.

"I see a singular-looking fruit, of a pea-green color, about half as large again as a large-sized apple, but much longer than that. It has two well-defined lobes; and from the blossom-end, which is deep and hollow like a cup, grow six or eight green, narrow leaves eight or ten inches long.

"This style of building is no more common, I think, than a circular form, which is in every other respect quite similar. Both styles prevail extensively.

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"I seem to be in one of the rooms now. It is very large. There is furniture here. I see long lounges, or seats, on which people recline. I obtain this by sensing the life of the people; but I do not see them, nor many of the objects in the room.

"There is a peculiar air of scientific investigation here, — a great deal of thought, of study, an atmosphere of culture and intellectual strength. The persons here are devoted to scientific research, and in a great many different directions. I feel all this and more; but I see no one.

"I also feel the influence of great mechanical skill here; but it is subordinate to the scientific influence. The mechanical skill seems older and more perfect than the scientific ability. Both have, I think, reached greater perfection on this than on our own planet.

"Such music I never heard. I have been trying to learn its source; but I cannot find it. It is clearer, sweeter, and at the same time more penetrating, than any I ever heard before."

A SUPERIOR PEOPLE ON MARS.

JUNE 13, 1873.

Mrs. Denton's fourth examination.

"I see an immensely long building, with wide arched windows that descend to the floor. Some of these are open; and through a number of them I see persons who are apparently at home in the magnificent rooms they occupy. But, oh, such people! and such rooms! The people seem to be in advance of all I have seen on the earth in many respects. They are physically and mentally our superiors. They

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seem to have based their physical culture upon scientific principles, until they have reached the very perfection of physical development. They have studied to live in harmony with all the laws of their physical life, until they appear to have no temptation to violate those laws. The result is a wonderful purity, harmony, and completeness of the whole physical being.

"In their social life there is more leisure, more order, more individuality, than among us. They seem to live the idea expressed by the motto, 'Each for all, and all for each,' and to have done this until they know no narrow, selfish ends in life, and have no desire for aggrandizement, honor, or preferment, that is not wholly subservient to the public good. Indeed, they seem to have controlled selfishness and all the baser passions, until they are the mere servants of the higher and nobler powers of the soul. I question whether they have what we recognize by the word 'governments,' except it may be such regulations as they deem necessary for the more effective distribution of means for the accomplishment of desired ends. And in this there is not, that I can now discover, any antagonism, and never discord. Their controversies, if they have them, seem only for the discovery of truth, never for triumph of person or party. What we recognize as courts of justice are to them unknown or unemployed institutions. I sense no such difference in social conditions as we have here: I do not think they exist. I cannot find among them any persons who seem low or degraded; nor do I see such suffering as we meet almost everywhere on this planet.

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"Physically they do not appear to be as heavy as we. There is a buoyancy in this respect that I do not understand. The complexion is of a purer white than is that of the Anglo-Saxon race; the eyes are generally of a bright sky-blue; and the hair varies in shade from a bright straw to that of a deep gold color. Mentally they seem able to accomplish any thing they undertake. They have studied our planet, and have become very familiar with it. I believe they have traced us out as a people. I do not know how they have done this; but they seem to know a good deal about us. They seem familiar with other planets also. I believe we can, in time, learn to hold communication with them. Perhaps they are psychometers!

"They appear to have a great deal of time for culture; and, besides, they are such thinkers, and such workers! They make actual conditions conform to ideal conditions. All share in the delights, and all lend ready and willing aid to secure them."

AN INFERIOR RACE.

"Now I am in a place a long way from there, where all is different. The scenery is changed; every thing is changed: but the great difference is in the people. These are more like the people of this planet; that is, more like the majority of our people here. They seem like an entirely different race from those I saw before. I cannot see that these are separated from the others by any great natural division of the surface of the planet; but their condition, their habits, and their lives, are wholly different."

("What is the physical condition of these?")

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"I get mental conditions best. I find antagonisms and selfishness that I did not find with that other people. All that I see here are dark colored, — very dark; but I should not call them black. I cannot get individual features. I think there is a difference in physical structure; but I cannot get it clearly. They seem much like us in many respects. There seems to me to be a world-wide difference between *us* and the other people I saw. It will take us a long time to get where they are, even physically. I do not like to go among these people from the others. I do not think they know about the others. Yes; they know about them: but they do not seem to have the least idea that they can ever be like them; nor do they care to be like them. They differ greatly from us in this respect. They seem to feel with regard to those superior people as the Indians do with regard to us. Taken as a people, they are lower in the scale of intelligence than are many of the peoples of this planet."

HOMES AND HOME-LIFE ON MARS CONTINUED.

JUNE 17, 1873.

Mrs. Denton's fifth examination.

"Mars seems like one of our own household, it is so near in comparison with those distant stars.

"Now I see a long building like one I have seen here before, — the one with broad, arched windows. I think it is made principally of some kind of metal; but, whether metal or stone, it is deeply fluted from top to bottom. I think it is the same building where I saw the people through open windows in a previous examination.

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"I can only account for the adoption of this style of architecture by considering each of these immense structures — with their luxurious apartments, their convenient and elegant appointments, their labor-saving arrangements, and their gardens of abundant bloom and luscious fruits — as the home of hundreds, and perhaps of thousands, of individuals. All the necessities for a large, active, and refined population, appear to be collected in every one of these square, circular, or octagonal buildings, as the case may be. If this is communistic life, why have we not adopted it on this planet before to-day? (I feel constantly that they know all about us.)

"I am in a long, large room now. Every thing connected with these people gives me the idea that whatever they do or design is done and designed in the most strict conformity to such principles as must inevitably secure the object sought. For example, this room, which is immensely long and large, is so constituted, that any person in any part of it can hear the lightest whispered breath in any other part of it. I am at one of the extreme ends. There are persons at the other extreme end: they are speaking, it is evident, scarcely above the lightest breath; and yet I can hear them with great distinctness. There are persons also, in the centre of the room, who also hear them; and other persons outside of this room, just opposite a broad open glass door on the side of the room, who hear them. They seem to be testing the power of the room to convey sounds: I think, rather, they are cultivating their vocal powers.

"That broad glass door opens into a magnificent

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conservatory, in the centre of which is a large marble tank of water, in which are growing several kinds of water-plants; and around its base, on the outside, are beds of low plants of luxuriant growth and bloom. This conservatory is lighted from the roof principally. It can be thrown, with the long room I saw, into one, when occasion requires."

("Are there any people there?") "Yes: I can hear them walking and talking, but not distinctly.

"These people seem so exceedingly simple in all their habits, and, though surrounded by all this beauty, to be so earnest in their pursuit of knowledge for its own sake, and so unselfishly disposed to persevere and acquire for the sake of all, as much as for their own sakes, that I am thoroughly charmed by them. In all their feelings and their very thoughts they seem perfectly transparent, and manifest no disposition to cover up or hide any thing."

A LIBRARY ON MARS.

JUNE 18, 1873.

Mrs. Denton's sixth examination.

"I see a fruit like a pine-apple, and a plant with thick, broad leaves. There is much here that I cannot understand.

"I am in a long, large room again. In it I notice particularly a large number of globes. Some of them are revolving; while others seem to be stationary, or fixed on stationary stands. They are of different sizes; are figured; and one of them greatly resembles the photograph of our moon as seen through a stereoscope. It is of the same color; has similar irregu-

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larities; and is, I feel sure, intended to represent our moon. It is a globe of about two feet in diameter.

"I am in a room now where there are two rows of columns nearly the entire length, one on each side, leaving aisles on each side of apparently the same width as the nave. The lower part has no windows that I can discover from the inside of the room, and receives its light from windows in the story above. I do not know in what part of the building I am, but do not think I am on the first, nor perhaps on the second, floor.

"Everybody I have yet seen here wears the clothing loose from the shoulders, and merely confined by a belt at the lower part of the waist. There is very little, if any, difference between the dress of the sexes, so far as I have seen. In all cases, the dress is loose about the chest; and nothing appears to have prevented its fullest expansion. The weight of whatever is worn is supported by the shoulder; and a desire for the most perfect development of body, as well as of mind and heart, regulates all their supplies, and satisfies or controls the craving of every appetite.

"Here, too, there are grounds of indescribable loveliness, and a great variety of birds of wonderful beauty."

GEYSERS ON MARS.

AUG. 24, 1873.

Mrs. Denton's seventh examination.

"I am in a different locality from any I have seen here before. I seem to be on the land; but there is a large body of water at a short distance. A few feet

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from me, and still farther inland, there is a circular basin of water: whether natural or artificial, I cannot tell; though I think it natural, with an artificial covering. This covering is perforated by a great number of round holes, — some large, and some small. The largest, of which there are three or four, are, perhaps, from three to five feet in diameter; and others are of various sizes, from one inch to one foot. Through these perforations, jets of water are sent to various heights; the largest apparently reaching a height of perhaps two to three hundred feet or more. From this towering height the water falls in continual showers of rain and spray. There are from forty to fifty of these columns in an area of about an acre. When the sun shines, or in any strong light, this is one of the grandest conceivable sights."

A PARADE.

"Now I see a great many people on animals that greatly resemble the horse of our planet. The people are all dressed in closely-fitting garments, and appear to be divided into two parties. All are seated in the same manner; that is, astride: and yet a part of them are females. I see, however, scarcely any difference in the dress on this account. But the two parties comprising this concourse are distinguished by the color of the animals on which they ride. These are of two colors, — pure white and a rich chestnut.

"Now the party on the white animals have separated from those on the colored animals, and are riding off by themselves. There are certain persons among each party that are more richly decorated than the

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others; though their garments are precisely the same, except the decoration or ornaments. These persons are apparently leaders or directors of the movements. I should call them the 'marshals.' All these have long, streaming plumes in their thin caps; and something beside plumes, that floats back on the breeze as they ride. I do not see what their caps are made of; but they seem very thin and soft. Their dress is also of a delicate texture; but I cannot tell of what material it is made. It is of something exceedingly pliable, however. This seems to be some kind of a parade; but, so far as I can discern, I am the only spectator present. All here appear to belong to one party or the other, and all have some part to perform in the ceremonies of the occasion.

"These people are all very nearly the color of the Anglo-Saxon race." ("What is the difference?") "The only difference I notice is a slightly deeper and brighter tinge, apparently belonging to the skin itself, and giving it a peculiar pinkish hue.

"They seem to belong to a different race from that highly-cultivated people I saw in another part of the planet. Though they have adopted some of their customs, and appropriated much of the art, and more or less of the scientific knowledge, of that people, they still prefer many of the more rude and hilarious customs of their own ancestors to the more quiet and refined enjoyments of that other people. They are much superior to the dark race that I saw on another occasion.

"Now I see a large number of them with masks on. I recognize them as the same people; but they

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are horribly masked. They seem to delight in exhibitions of this character.

"Seen from the front, the animals on which they were riding do not so much resemble the horse as they seemed from the side-view I had of them. The front head is broader; the neck is more curved, and longer, but not so large; and the face is carried in a more perpendicular position, while at the mouth it is considerably narrower. The animal has a long, small tail; and its whole frame is smaller than that of the horse."

A LIBRARY ON MARS.

AUG. 26, 1873.

Mrs. Denton's eighth examination.

"I seem to be where there is water, and a broken, ragged coast. A little way back from the coast I again see jets of water like those I saw the other evening. I think it is the same place. Like those I saw before, the water of these rises to a great height, and then falls back in rain and spray.

"I am now again in that part of the country where the people are so much advanced. There is a great deal that is ornamental all through this region, both in and out of doors. That portion of the planet one would be likely to reach first in going there in a straight line from here is all, as yet, a sealed book to me. To reach the place where these people are, I have to move a long way from the place where I first reach the planet. This I have done, principally, by way of the water.

"I am now in what *we* should call an enormous

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library. The books are in much the same general style of those we use; though they appear to be made of somewhat different material. I see numbers of volumes of immense size. There are several with rods running through the centre. The rod, with the book secured to it, which is done by clasping it tightly around the rod, is fitted into a light frame in a perpendicular position. The book may then be readily raised or lowered at will by a very simple arrangement, which may be adjusted without even raising the eyes from the page. The value of such an arrangement will be appreciated when it is understood that the great length of the book would render it exceedingly difficult for one to read the upper portion of the page when the lower portion was on a level with the eye, and equally difficult to read the lower portion of the page if the upper portion of it were on a convenient level. A large number of the books I see here are fully three yards in length (with width neatly proportioned); and some are, I think, considerably longer than that. The pages in this style of book follow each other in regular succession through the book *on the same side of the leaf;* then back again, in the same regular succession, *on the reverse side of the leaf.* By this arrangement, four persons can read nearly the entire book at the same time, without other inconvenience than that of allowing to each reader sufficient time to examine one or two pages before the person intending to follow him shall commence.

"The lower end of the rod, to which the book is made fast, is placed in a shallow metallic thimble

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fixed in a movable cross-bar of wood. Another but lighter movable cross-bar, with a thimble exactly corresponding to this, and set in the same relative position, is inverted over the upper end of the rod. Both bars are then made fast to each other, and all is secure; while the rod, with its burden of art, is left free to revolve, and the united cross-bars ascend or descend at the will of the person examining the book.

"The books of this style are without covers. They have strong back-bindings, that may be clasped or unclasped around the rod at will. The clasps belong to the rod, and, when the book is in its place, are only visible above and below it. They are adjustable, and may be used for a book of the largest or smallest size.

"There are various other styles of stands for the support of large and small volumes, without burdening the reader to hold them; but I think the description I have given sufficient.

"Some of these volumes contain only paintings; others both illustrations and text. The representations they contain are faultlessly faithful. No human skill could, it seems to me, produce such truthful representations. I can conceive of nothing but the photograph that can equal them; and yet they are no more faithful in representing forms than colors, every tint of which seems true to Nature herself. I do not know how they are produced.

"This library is connected with an immense hall, in which there are several partial divisions. One of these is devoted entirely to statuary, representing

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almost every conceivable animal form. One of these statues represents four persons, so united that the four faces are turned to the four points of the compass. I get no idea of the object of this representation.

"I cannot now tell to what the other portions of the hall are devoted. The several parts are only separated by light, open work, apparently of some kind of metal, and about three or four feet high. Above this the room is one.

"I am outside of the buildings now, and see a long avenue of elegant and elaborately-finished pedestals, supporting large vases of flowers. At a distance the avenue leads up a hill to beautiful grounds enclosed by thickly-growing shrubs and vines. The grounds are laid out in figures of various forms; while trees and shrubs and flowers are grouped in the most harmonious and tasteful styles. I see no vases nor pedestals inside the enclosure.

"On the top of the hill, which is apparently quite circular, stands a very large circular building. The outer walls are almost entirely of some transparent material, which looks like our glass, and is the same as is used for windows in their buildings at other places; but I have not yet ascertained whether it is of the nature of our glass. I do not know what material has been used for the frame; but I think it some kind of metal. There is only sufficient of this framework to sustain these immense plates of *glass*, if such they are. The hill is by no means a high one. Perhaps mound would have been a more appropriate name; though it seems rather high to be called a

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mound. Taken as a whole, this is the most beautiful place I have seen anywhere. But I do not find myself able to go into the building, or to move freely about the premises. I do not think these circular buildings are quite as satisfactory in their interior arrangements as are those they have built in the form of squares; though perhaps I am mistaken in this. To my taste, the former are more beautiful to an observer at a distance; and possibly they may admit of equally convenient internal arrangements.

"I now see a broken pillar belonging to an immense structure. There are here, separated only by wide streets, four of those large square buildings, combining homes for individuals and families, academies of science, philosophy, and art, private and public libraries, conservatories of rare and choice plants and flowers, and, in short, almost every convenience and comfort that thought can suggest."

A TELESCOPE ON MARS.

"In the middle of one of these wide streets, or more properly, perhaps, open parks, between two of those combination-buildings, stands a great solid square stone tower. It is constructed with a base apparently about twenty feet in height, and extending on all sides perhaps eight or ten feet beyond the central portion of the tower. If I estimate it correctly, the central portion is about one hundred feet in height from the surface of the ground. The top is finished with a turret, so constructed that it can be made to revolve when desirable. This turret appears to be about eight or ten feet in height; and into it is

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fitted an enormous tube, which I have before seen on several different occasions, but which I have until now supposed to be a tunnel in the street; but as I could not understand its object, or the method of its construction and use, I did not mention it. On seeing it now, as before, I thought it a tunnel under a portion of the street or park, until, on moving to one side, I saw the joints of a large metallic tube. The upper end is fitted into that turret, as stated; and the lower end rests upon a movable structure or car below. I can see persons looking into the lower end of it; and I believe it to be to them what the telescope is to us. It is so large, or so arranged, that several persons can look through it at the same time. The wheels of the movable structure or car, on which the lower portion rests, are set in grooved metallic tracks, that describe several circles around the base of the tower.

"Above the base there are four or five platforms encircling the tower, at a distance from each other of from fifteen to twenty feet. The diameter of the tube is apparently from twelve to fifteen feet, or perhaps more than that. The turret is circular at the base, and divided at the top. There are small windows both in the base and in the central portions of the tower. I see none in the turret above. This is the first time I have seen *small* windows in connection with any of their structures.

"Any power applied to that car upon which the tube rests, sufficient to start the wheels in their tracks, causes the turret to revolve in an equal proportion; and the tube is so fixed in the turret, that,

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when desirable, the upper end can be raised so as to sweep the heavens from the horizon to the zenith. This is done by simply running the car on to the inner tracks around the base. The arrangements for doing this are simple, and the changes are easily made."

VEHICLES ON MARS.

SEPT. 2, 1873.

Mrs. Denton's ninth examination.

"On several occasions I have noticed a very (apparently) complicated machine. I have thought it might be a printing or stamping machine, but could not be positive. I seem to be in a room now where there are from twenty to thirty of these and similar kinds; but I cannot yet understand their use.

"I see a great variety of carriages; but they are run without horses or other animals as are required for the use of our carriages. Unlike ours, the front and back of these are the same; and they may run either way equally well; and the direction may be changed without turning the vehicle around. They can be made to move with great speed if desired, or slowly if preferred. I cannot see by what power they are propelled.

"The lighter carriages, those for persons only, are generally, I think, made with four wheels, — one in the middle, on each side; and one in the middle, on each end. Those for conveying heavy burdens have six large wheels, — two on each side, at about equal distances from the centre; and one at each end, as in the case of those with four wheels. There is also a

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kind with five wheels; but this must be turned round when its direction is changed.

"I think the moving power employed is electricity, which is apparently generated by a battery of some kind, made fast to the under-portion of the carriage. Whether this is the force employed or not, a dial, which may be readily changed from one end of the carriage to the other, marks the amount of force generated; and the amount is regulated by a rod in some cases, which the occupant of the carriage can adjust without inconvenience. The dial is generally placed at whichever end is used at the time as the front."

AERIAL CONVEYANCES ON MARS.

SEPT. 12, 1873.

Mrs. Denton's tenth examination.

"On several occasions I have seen various kinds of aerial conveyances. Some of them are large, others small. They are of several styles. In one of them that I see now, there are, I should think, from twenty to thirty persons; and it is apparently intended for a much larger number. Those persons appear to be as free from apprehension of danger as are any of our people in the various modes of conveyance in use among us. I do not understand all the principles upon which these vessels are constructed, nor those upon which their motions are governed and their course directed, all of which are as thoroughly understood by the aerial navigator there as are those that govern water navigation by the mariners of this planet.

"If some of our aeronauts could see these vessels as I see them now, they would probably comprehend

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at a glance all the principles upon which they are constructed and regulated; but I cannot comprehend them."

AN ORRERY ON MARS.

SEPT. 16, 1873.

Mrs. Denton's eleventh examination.

"I am again in a large room where there is a library with many books of enormous size. One of these, that stands open on a peculiar stand or desk, has large colored plates in it, — a great many of them. They are splendid. I think they are representations of scenes on our planet. I believe they know a great deal about the *people* of our planet. They seem to me to watch the progress of the various races here with a great deal of interest. By what process they do this, I cannot understand, — whether by their more powerful and more perfect telescopes, or whether by some other means, I do not know; but, almost since I first saw them, I have felt that they know of us.

"In another part of the room I am in, I again see various kinds of globes, mounted in different styles. On one stand a large number are so arranged as to represent some system of stars. I think it must be our solar system; but it differs from any representation given of it by our astronomers, or any that I have seen. Like the orrery, it represents the relative sizes and various positions and orbits of the planets and their satellites, — and all these in motion: but I cannot tell upon what principle they are made to revolve, as they appear to do; for I see no rods connecting them.

"I have noticed this apparent motion of globes in

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groups like this on several occasions before, but desired to discover the principle upon which these motions are secured before attempting to describe them. I have not yet been able to do so.

"If this is intended for *our* solar system (as I think it is), they have here represented *five* planets between the sun and our earth. Between Mars and Jupiter, or what seem like them, there is represented a large *cluster* of small, and some of them very small bodies, revolving on their axes; some of them with satellites revolving around them, all of them revolving around a common centre of apparently vacant space, and the whole group also revolving as one planet in an orbit around the sun. While then, taken as a whole, this group might be regarded as a planet with its centre vacant, or rather as a planetary *ring*, yet, taken as separate bodies, they *all* have the three motions common to all the known satellites; and some of them have still another motion, as of a satellite around a satellite.

"There are in this group, I should think, thousands of these bodies, of almost all possible sizes, from the largest to the smallest. Still they appear to preserve the same harmony as that which characterizes the motions of the larger planets and their moons.

"The speed on its axis of every individual body in this group is, it seems to me, incalculably great. Still, other things being equal, the smaller the body, the faster it seems to revolve. Some of these smaller bodies appear to revolve so rapidly, that they are continually swept clean of any dust that might otherwise collect on them by the wearing-away of their surfaces.

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This dust (for they do wear, however slowly) is constantly drawn up toward the *equator* of the body, and there thrown entirely off its surface, where it forms a dusty ring, still revolving, though with less velocity than when it constituted its share of the rock of which the body was composed. By this means some of these bodies are masses of perfectly naked rock, and are gradually diminishing in size.

"I seem to get these last few particulars rather from examination of the bodies themselves than from representations by the apparatus I was attempting to describe. I know I do not see here such an immense number of bodies represented, nor yet the revolutions that change any loose material on the surface into dusty rings, entirely free from contact with the body in motion. All the other particulars seem to be very faithfully represented by it. I have not counted them; but I think there are from two to three hundred of the bodies of this cluster represented by this apparatus.

"I do not seem to reach the planet at the same point that I did some time ago. I have to move some distance after reaching it before I get to these people."

("Are there warmer places at the poles?")

"I think there are. There seem to be both land and water in both polar regions, — more land at the south pole, more water at the north pole, if I get the poles correctly.

"A little back from the north polar point, there appear to be, on one side, high rocky cliffs. On the other side, the land is apparently on a lower level; but it seems to me to be damp, cold, and unpleasant. The

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water around the pole is not frozen, and even seems warmer than the land.

"Back of the rocky cliff there appears to be a belt of ice and snow that encircles that portion of the planet.

"There is, I think, a similar belt of ice and snow encircling the south polar region, but at a greater distance from the southern polar point. The land near the south pole seems to be much lower than that near the north pole, and the climate seems warm and delightful."

("Can you go to the night-side of the planet?")

"It appears to be night now on the side of the planet where those refined people live.

"They have an artificial light that seems to me more like sunlight than any thing that we use. The nature of it appears to be quite similar to the light of the sun. It gives the same tint to colors. It illuminates a vast expanse, and almost turns night into day. With their windows open to this, they require no other light in their buildings: indeed, I think that any artificial lights we use would pale before it as the light of a tallow candle does in the light of our common gas. I do not see what gives this light: but it is apparently a long way off; for the light is *diffused* much as is sunlight when the sky is overcast by rather thin clouds."

SLEEPING-ROOMS ON MARS.

SEPT. 20, 1873.

Mrs. Denton's twelfth examination.

"I am in the very attic of a division of one of those large square buildings. The entire roof, except the supports, is of what I think I must call glass, as all

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their windows are made of it. The roof is dome-shaped, or as nearly so as it could be made and have any framework at all. The whole attic of this division is, I think, in one large room. No; I am mistaken: this room is only one portion of the division. It is so large, I thought it the entire attic. In this room there are no less than eight or ten *lounges*, I think we should call them. There are several persons asleep here on these lounges; but no lounge has more than one person on it. They have all lain down with the same clothes on that they have worn through the day. I am quite surprised at this; for I thought to find them as particular in reference to their sleeping arrangements as in reference to other matters. These lounges are not of 'downy softness;' though they are not hard, by any means.

"They seem to have chosen this high part of the building for the sake of the dry, pure air; and this style of roof, that the room may receive all the rays of the sun possible.

"At one end of this room there are three bathing-apartments with closets, in which are entire suits of fresh, clean clothing for each individual. Before bathing, each individual old enough to do so, whether male or female, arranges his or her own bed or lounge. The men occupy one of the bathing-rooms, the women another; and the children are taken into and bathed in a third, which, in this case, appears to be between the other two. With them, as with the older persons, the entire suit of clothing is changed every morning.

"I see no windows in the sides of the room where

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I am; but, at a short distance from here, I saw one with the walls, as well as the roof, almost wholly composed of windows. In that room the wall-windows have heavy curtains, which are sometimes used to shade them, and are sometimes looped back at the sides. They were looped back when I saw them. I am mistaken in reference to there being none in this room I am in. The walls here, as at that other room, are almost wholly composed of them; but they are so thickly shaded, I did not see them. These curtains are also removed from before the windows, unless when the room is in use and the occupants prefer them closed. When they are closed, however, it is only to shut out the side-light, or to protect from observation. The entire roof is without shade that I can discover, and, I think, is never intended to be shaded. I think this is the general style of their sleeping-apartments.

"I do not know how many baths there are in each bathing-room; but there are quite a number of them. Even these bathing-rooms are separated from the sleeping-room only by windows that come to the floor, and, except when in use, are left uncurtained, and are, as the sleeping-room, almost wholly of glass.

"All the buildings of these people appear to be so constructed as to allow the occupants the greatest possible amount of sunshine and air that may be secured to them in permanent dwellings.

"I see no lounges in this sleeping-apartment that seem to be intended for more than one person. Whether they have such or not, I do not know; but men and women are both sleeping here."

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A DINING-ROOM.

"I am down in a lower room now. I think it cannot be less than a hundred and twenty-five feet long. There are in it three long tables, with three or four short tables at each end of the room.

"These tables are very peculiar. They are mere frames of wood, into which are set, on both sides and at each end, small metallic frames fitted for various forms of dishes, much as our castor-stands are fitted for the castors we use. This metallic frame is so arranged that it may be made to revolve at will, or it may be made fast at will. I think this is done by pressure upon a certain pivot fixed in the wooden frame. Into this metallic frame, which is really a model of beauty by itself, are set all the dishes of whatever kind desired or intended to be used by each individual at any one meal. I do not know by what means they ascertain the desires of each individual; but, by some means, individual tastes are consulted, so that all are satisfied. I think the metallic frames in the several tables are all numbered; and, in the long tables, there are about a hundred in each side of each table, and ten or twelve on each side of the small tables. With this arrangement, every individual has really a revolving table to himself. There are thus no waiters required; and there is no reaching to other parts of the table for supplies. I think they would regard our system of 'waiting upon table' as not only cumbrous, but as confusing beyond endurance.

"They do not appear to require a great variety of food at their meals · but I cannot tell what they use.

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"They are remarkably social at table; and *all* appear to be entertained and entertaining. I see no *very* small children at these tables. I judge this room is used only as an eating-room.

"That frame I mentioned in one of my earlier examinations of this planet as being a framework for dishes, I have never understood until now. That was made in a similar style, though it was entirely of metal. There were but four of those revolving parts to that; and I fancy it may have been intended for a group of three or four persons who might wish to converse upon topics of interest to themselves, but of less interest to the large number of persons present at the large tables, and to save confusion by conversing on other than the general topic for the occasion. Or those small tables may be used for persons, who, from age or other reasons, are unable to leave their rooms for the general eating-room.

"They have a machine for sweeping their rooms that seems to move automatically. It is set in motion, I think, by being wound up; but I cannot understand upon what principle it is constructed. It is from three to five feet high, and is covered with some kind of thick cloth which confines all the dust. They set it in motion, and have no more to do with it until it stops, which it seems to do in the centre of the room. It sweeps the outer portions of the floor first, gradually diminishing the diameter of its coils until it reaches the centre. I see no furniture in the room where I see it in operation.

"These people appear to exercise great care in reference to permitting any uncleanness. I feel no influ-

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ence of filth or of decaying matter anywhere about their buildings or their grounds; and I see nothing in their country that appears to look like it."

In these examinations, there are, as were to be expected, several apparent discrepancies; most of them resulting, I think, from the different portions of the planet, and the different peoples residing upon them, that came under the notice of the respective psychometers, and this owing, in a great measure, to the different times at which the planet was observed. It would have been much better, I think, could the planet have been observed by each at the same time of the year and of the day; but this I did not think of till it was too late.

From these examinations, I judge that there are at least four distinct races of human beings on Mars, between some of which greater differences obtain than between any existing races on our own planet.

The four-digited race, seen only by Sherman, occupies, in my opinion, a region in the immediate vicinity of the equator; probably that called Madler Continent, as represented on Proctor's map, which is probably correct as far as the main features of the planet are concerned. This is the locality he first reached, and where he saw the turtles and monstrous trees.

Much inferior to this is the dark, stunted race seen and described by Mrs. Cridge and Mrs. Denton. Of their location, Mrs. Cridge says that they are "in the south-western portion of the Western hemisphere, approaching in that direction to the verge of the

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Eastern, on a large tongue of land jutting out into the sea, something like Southern Africa, but smaller, in the southern hemisphere, but not near the south pole." By looking at the map of Mars (Fig. 106), it will be seen that the western part of Secchi Continent, which extends into Maraldi Sea, corresponds exactly with the position she assigns to this race. When Mrs. Denton saw what I think is the same race, I asked her to point out on the map that portion of the planet on which she thought this inferior race resided. She pointed to the western part of Secchi Continent, at the locality marked by a cross on the map. Sherman does not appear to have seen this race at all.

A third race is the pink-skinned, and, as represented by Mrs. Cridge, the star-eyed race, seen and carefully described by Mrs. Cridge, noticed by Mrs. Denton, and, as I think, frequently visited by Sherman, who, however, does not notice that they are different from the people of this planet. This race appears, as a race, to be considerably in advance of all the races on this planet in many respects; and yet if they worship images, as Sherman and Mrs. Cridge describe them as doing, we must consider them as decidedly inferior to us in some other respects, though decidedly in advance of the four-digited race. This pink race lives principally, as I think, on W. Herschel's Continent; and Mrs. Cridge's observations during her last seven examinations seem to have been almost entirely confined to a city in the northern part of that continent occupied by this race. Being winter when she visited it, she did not notice many things that attracted Sherman's attention.

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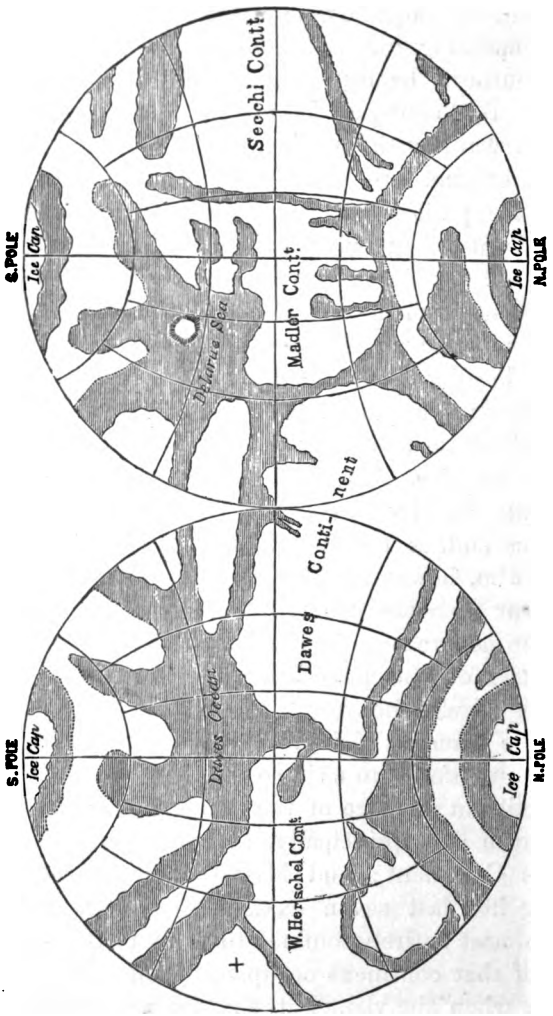

FIG. 106.—Map of Mars.

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A fourth race is the superior race, described by Mrs. Denton alone, who occupy, as she thinks, Dawes Continent, which extends from a few degrees south of the equator to the northern portion of the north temperate zone. This race appears to be far in advance of the other races on Mars, and has adopted the communistic system of living, and carried it out as it only can be carried out by human beings who have advanced much farther in intellectual and moral development than time has allowed any race to do as yet upon our own planet.

JUPITER.

Jupiter is by far the largest planet of the solar system, being eighty-seven thousand miles in diameter, and more than twelve hundred times as large as the earth. It has four moons, which accompany it, and revolve around it as the moon does around the earth. Its gravity is so much greater, that a pound-weight on our planet would weigh about two pounds and a half if carried to Jupiter. The year of this planet is nearly twelve times as long as ours; but its day is a little less than ten hours. The seasons are but slightly varied. Summer reigns during the whole year near the equator; while the temperate regions have a perpetual spring, and the polar regions constant winter.

So rapid is the motion of Jupiter on his axes, that the equatorial diameter, in consequence of the bulging-out produced by its centrifugal force, is 4,900 miles greater than its polar diameter.

Our psychometric researches have not been directed

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to Jupiter as much as to Mars; and I had thought, at one time, to publish nothing in reference to Jupiter till we could have given to it more careful scrutiny. Other matters, however, crowd upon us: and I give the following fragmentary observations of Jupiter by Sherman, which are almost exclusively confined to the animals and plants of the planet, which seem to differ very considerably from ours; and my sister's more elaborate examinations, principally of its human occupants.

PLANTS AND ANIMALS OF JUPITER.

MARCH 1, 1869.

Sherman's first examination.

"I am not far from it, and I see a great crater. The mountain looks so curious! It seems flat. I am over it, and cannot see any peaks; but I see the crater very plain. Cracks go out from it; and they are filled with something lighter colored than the mountain. As I go nearer, it is brighter: it must be lava. No: when I got nearer still, I saw it was light from somewhere else. It reflects the light: it must be the sun's light. It has been lava once. It is glassy, and has bubbles. The crater must be four or five miles across. There is a wall all round the crater.

"There are some very stunted trees there. They are more like trees than any that I have seen on the planets before; only the leaf is very thick. It is about four inches long, a quarter of an inch thick, and three inches wide. When you take hold of them, they stretch like rubber. It is hard to pull: but I pulled one out till it was about a foot long; but it was nar-

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row. It went back slowly to the shape and size it had before. The tree is about six feet high, and four or five inches through, and bends very easily. It bends with an even curve. Why! the tree stretches too, but only a little. I stretched one about two inches. I notice, when I pull the leaf out, the veins stand out like ridges on it.

"Down the mountain I see more trees. I see another kind that look like toadstools, but are no higher than my head. There is a tall plant too, of a sea-green color, with a large body, and two branches that curve toward each other to the top, and have a flower on the end of each. It seems as if it would break rather than bend; but it is soft, and something like pickled cucumber. They look very pretty. The flower is pink; but the leaves of the flower are green.

"That must be a good way off: it takes me some time to travel (twenty seconds, perhaps).

"I see another kind of plant, small, something like a thistle; but it is brown, not so large, and much thornier. The thorns are something like those of the locust.

"Why! in one place the ground is all like clay, but a great deal stickier. When I put my hand down, I cannot get it up without sliding it along, and lifting up one end. When I stamp on it, it trembles all over like jelly.

"What a curious animal I see! The mouth opens from side to side, instead of up and down. It is black, and spotted with yellow. It goes as slow as a snail. It is about three feet high. I see no legs. It is flat, round on the bottom, and moves like a snail, and

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very slow. I see no eyes anywhere. Now I see what look like grasshopper's eyes on each side, about an inch across. They are divided, and made of little six-cornered eyes, that look like the cells of the oil-coral. I thought they were eight till I counted them. They are larger than the coral cells. The animal is all smooth, like a lizard. It eats the leaves of that soft-bodied plant. It always stands up and crawls on its broad end. If a man should see such an animal, it would scare him. It has no teeth, but sucks its food off, and makes a noise as it does it. It moves its mouth fast. It bends the upper part of the body about, and is wrinkled in the middle. It opens its mouth so wide, that the sides lie back."

After supper the examination was continued: —

"I go through a great many clouds to get to that planet: they are white clouds.

"The lips of that animal are hard. There is a pipe goes from the mouth through the body in the inside: it enlarges gradually to the middle, and then gets small toward the bottom.

"I see one of the kind of trees they live on, much larger. It is ten feet high. In some places I see old dried-up leaves as thin as paper, and places where these animals have eaten leaves, and young ones are shooting out. I see more of those animals; but the one I saw before is the largest.

"There is a small animal like a bug on that thistle-plant. It has red wings, spotted black. The legs are like thorns. There is a horn on its head. It is the most like an animal of this world of any I have seen here.

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"Down in the swamps, and by the water, I see those toadstool-plants. The water looks the same as the water here; but the taste is very bad. It is horridly bitter: it just seems as if it would strangle me. I see a large body of water; but I do not see a living thing in it: it is the same as the other. The ground under the water is as white as paper; and, when I touch it, it roils the water like milk. Every little wave shakes it about. That white stuff is more bitter than the water.

"I see another splendid mountain, and a small stream running down it: that is good water, like ours. There is a rock on the mountain, soft and white as chalk, and easily broken. When I rub my hand on it, it makes it white. It looks like chalk.

"Well, if that is not strange! I see two large birds that look much like our birds. They have wings covered with hair, instead of feathers: their bodies are too. They are about two feet high, and have a beak about as long, that seems to be in the way. The neck is as short as a hen's. They swim on that body of water."

PLANTS AND ANIMALS OF JUPITER CONTINUED.

MARCH 7, 1869.

Sherman's second examination.

"I see an animal with a head that looks like a bunch of leaves. It lives in the water. It has very long claws; only three. It is a hairy animal. It crawls along at the bottom of the water. It is in this bitter water. I see small eyes among the hair. It

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sucks in that white stuff with three suckers that have little holes at the end. The long claws are white.

"There is a curious plant growing out of the water. The top of it looks like a bowl or a toadstool upside-down. It is very pretty.

"I see a kind of mineral about as soft as molasses-candy. You cannot drive any thing into it forcibly; but you can push it in gradually. It is near the water, and full of bubbles. It is red. When I stand on it, it sinks down; but, when I kick it, it sounds like a stone.

"I see a great flock of those birds I saw last night. They go 'Peep, peep!' and it sounds like frogs in a marsh, — some near, and some far off.

"Well, I declare! I see an animal like a great Newfoundland dog. It runs after the birds, and tries to catch them; but they can run faster than he. It has sharp pointed teeth, and looks as if it lived on flesh."

NIGHT ON JUPITER.

MARCH 18, 1869.

Sherman's third examination.

"I do not seem to be in the same place, and hardly on the same planet, that I was before. I see no bitter water; but there are hills that seem to be made of soft chalk. I see no animals here, except a kind of water-animal, like a turtle, that seems to leap along in the water."

("Go to the dark side.") "I see lights just like the northern lights, but very bright.

"This is a beautiful place where I am. I can see hills away off. I can see little things jumping along

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in rows in the water: it is so light, I can see them. I can see two moons, and one half way up. They are none of them as large as ours. The one highest in the heavens looks largest. I see a star very bright. Oh, how those lights shoot up! When I get in the shadow of a hill, and look over it, it looks like a red line along the outline of the hill.

"There is a marsh near here, and the grass sticks up something like rushes. I hear little animals, 'Peep, peep!' and the water in places rushing along." ("Go to the light side.")

"I see plants on the ground, almost as round as wheels, with ribs like spokes. There is a small circle in the middle crossed by lines, and lines from that all round. They are about two feet across. They are very hard and durable. It does not hurt them to step on them. The stalks break off like wood when they are twisted.

"I see a plant something like a cactus, but without thorns. It is in flower: it has little red flowers on the green body. There is fine grass on that planet, like silk. Some that I saw on the night side looked like changeable silk of beautiful colors.

"Under a big stone I see a bird's nest, made of brown earth, and lined with those leaves that are like paper when dried. There are two eggs in it; but I hardly know whether to call them eggs. They are curved at one end, and are set on the other end, which is flat. They are of a light-yellow color. Those dog-like animals live on these big snails. I see one grabbing a snail, and tearing it to pieces.

"When I get up high on this planet, it seems very

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uneven. I see smooth hills in ranges like great waves.

"I see something in a little brook that resembles a fish. It has a sharp tail that turns up; but it does not use it in swimming.

"I've come to a very high mountain now, and I've found another new animal. It resembles a snake; but the head and tail are both sharp-pointed. It has something on the end of its tail that is almost transparent, so that I did not see it.

"Well, I see another animal still. What a host of animals there is! I see a little pool of water on the side of the mountain; and there is a jelly-like animal in it. I can see through it. A blow strikes it in two. It floats round, and does not seem to have much motion.

"I see a thing away down from the mountain that looks like a little black speck. It is near a body of water. It is one of those big snails. It is four feet high, and two feet through. It stretches out one side, and draws the other along, and goes faster than I ever saw one before. It is very big round, and has a monstrous mouth. I thought certainly it was a man."

BALLOONS ON JUPITER.

MAY 15, 1870.

Sherman's fourth examination.

"This is a place where I have been; but I see some things that I never saw before. There is iron here, and houses are made of it: the whole frame is iron. The people do not look much different from

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people here. They have large beards: there is more hair on their faces than on their heads.

"Oh! I see a very nice floating apparatus, — a kind of boat. It is in the shape of a large swan, and goes by machinery, — a spring like a watch. They wind it up with a large crank. It goes very fast. It goes with paddles.

"The people are larger, if any thing, than they are here They have very broad shoulders.

"They have balloons here. They are square at the bottom, and go up to a point. They go up better that way. They have lighter gas than we have, and they go up very high.

"When the balloon gets so high that it cannot go any higher, it stands still. It cannot come down fast, because, as it goes down, the air makes a wheel turn round, that keeps it up a good deal.

"It is down now: the men below brought it down.

"They have boxes of the gas, with iron on the bottom to keep them from going up; and they let a little out of a small hole. It makes a great noise as it goes out. It takes very little to fill the balloon, — not more than I could hold in my hand. It swells out. I can see the balloon swell as it goes in."

STRANGE FLYING ANIMAL ON JUPITER.

Nov. 13, 1870.

Sherman's fifth examination.

"I am at that star all right now. I am in a thickly-wooded place. The trees do not resemble any I ever saw before. It is raining very hard. There is grass

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here, that has a great many blades on each stalk. The country is very wild.

"I see an animal flying; but it is not a bird. It has no feet, but some kind of projecting things that fold all up. Its wings are leathery. Its mouth is in the middle of its body; and it doubles up to open its mouth. The wings are square, and there is bone all round the edge. There are holes above and below the mouth. It can fly one way just as well as another, — up or down, backward or forward. It is covered with little scales. It is about as large as a robin, and is of a brown color, with a red spot in the centre of each scale. It feeds on grass and vegetables. It has no teeth exactly, but little rough things that bend in. The grass is bluer than ours."

MRS. CRIDGE'S EXAMINATIONS OF JUPITER. — THE ATMOSPHERE OF JUPITER.

DEC. 10, 1869.

Mrs. Cridge's first examination.

"The predominant color of the atmosphere (outer), which is rare, is a pale straw-color. There is a remarkable absence of redness in the atmosphere and in all thereto appertaining. Prismatically, the colors would probably be exhibited in the following order; viz., snow-white, vapory-white, pale shading into deep yellow, a very pale green, slight purple, very feeble red." (See Ex. 3, par. 2, and Ex. 4, par. 1, relative to redness.)

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ATMOSPHERIC PECULIARITIES OF JUPITER.

DEC. 12, 1869.

Mrs Cridge's second examination.

"The atmosphere immediately surrounding the planet is not of great height. There is about the heat and light that peculiar softness, and freedom from glare, which characterize them when reflected; and though there is not directly the warmth experienced in our planet at times, and in some places, there is also a freedom from severe cold.

"Up to this time, the feeling is one of *recognition* rather than of actual *presence*, as if the psychometric power went in advance of myself.

"Outside of the atmosphere immediately surrounding the planet I perceive another, more ethereal, and of much greater depth.

"Electricity is a less prominent feature in Jupiter than in Mars; and in this atmosphere there are less motion, less circulation of properties, gases, &c., than in that of Mars: there are in it great quietness and rest; and, to those whose organisms are adapted to the planet, it is highly invigorating.

"Jupiter is a very old planet, and has many times changed its characteristics, including its immediate atmospheres, whose modifications have corresponded to the successive changes in the planet, which still continue.

"In examining successive planets, I increasingly realize that their atmospheres are ponderable; each having its appropriate place around its respective planet, of which it is a permanent part, as much so

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as are the rocks or the water: those atmospheres are like things *grown out* of their respective planets, which they accompany in all their movements."

THE TEMPERATURE OF JUPITER.

"On nearing the surface of the planet, I realize more fully the absence of extremes in temperature. The light is of a peculiarly subdued character. I find my nature becoming assimilated to, or harmonized with, that of the planet, thus experiencing a capacity for enjoyment of conditions, which, to our present organizations, would not be pleasurable. For instance, what there constitutes an agreeable temperature, would be to us, as now organized, uncomfortable."

ATMOSPHERE OF JUPITER CONTINUED.

DEC. 17, 1869.

Mrs. Cridge's third examination.

"The inner atmosphere is warm, the outer cold, and still colder as it recedes from the planet. The inner atmosphere is, more than the outer, akin to the planet in its present condition, and has great power to absorb and retain heat.

"Now I realize the quality of redness somewhere, which I cannot localize.

"The atmosphere next the planet differs in color from the stratum above it; but they merge into each other like the colors of the spectrum. The former is denser than the latter, and has a much stronger chemical affinity with the planet; so that, by the attractions both of gravitation and affinity, it is necessarily contiguous thereto.

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"I realize psychometrically that there are human beings on this planet, but do not yet see them."

ATMOSPHERIC PECULIARITIES CONTINUED.

DEC. 19, 1869.

Mrs. Cridge's fourth examination.

"The redness is peculiar to the *inner* atmosphere, in which yellow and red predominate: in the next atmosphere yellow alone predominates, which becomes paler and paler as the successive atmospheres recede.

"By reason of the peculiar capacity of its inner atmosphere for absorbing and retaining heat, the planet enjoys a much higher temperature, than, considering its distance from the sun, would be supposed. The atmosphere is likewise retentive of light, which causes the sensation of their being reflected (Ex. 2, par. 1). Thus this retentive atmosphere seems, as it were, to brood over the planet, overshadowing it with a sensation of comfort and warmth, and with a rich radiance, having all the mellowness characterizing a beautiful day here before sunrise or after sunset, but with more light, and less glare."

THE SURFACE OF JUPITER.

"Now I realize that I am on the surface of the planet; but there is an indistinctness of vision, a consciousness of influences and surroundings not yet definitely outlined.

"I feel a power by which I am enabled to compare the specific gravity of substances in this planet with corresponding substances on earth. The rocks and

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earth here (in Jupiter) present similar appearances to those of this earth, but in weight are as sand thoroughly dried to sand thoroughly wet, or perhaps even a greater difference than this proportion would represent. The impression received is that of its being the same *matter* substantially in each case, but that, in Jupiter, it is freed from the gross dead *weight* belonging to a condition less developed."

DISTRIBUTION OF LAND AND WATER.

DEC. 20, 1869.

Mrs. Cridge's fifth examination.

"There is more land on it than water, and more land in the northern than in the southern hemisphere. In specific gravity the water approaches the land much nearer than on our earth: I do not perceive any marked difference in specific gravity between their water and ours. In the southern hemisphere I perceive many small islands. Only in one place do I see an opening by water to the north pole, which is surrounded by water, — a very small sea, however, compared with the magnitude of the planet. On one side this sea is frozen, and there is snow: on the other it has thawed."

THE INHABITANTS OF JUPITER.

"Near the equator I obtain glimpses of inhabitants, whose physique corresponds with that of the planet, their bodies being remarkably light; a person whose weight we might suppose, judging from stature, to be one hundred and twenty or thirty

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pounds, being as light as an infant, and weighing not over eight or ten pounds, taking our standard.

"There is very little cold on this planet. By reason of the matter being less gross, and imponderable elements consequently more powerful, there is more heat born of and belonging to the planet, — chemically produced, as perhaps it may be said. The imponderable agencies have more to do with its evenness of temperature than any other causes.

"It is an old, old world. I receive the impression of a constant, long-continued process of gradual purification; the grosser materials being thus eliminated, refined, or rendered imponderable: hence its present low specific gravity. Once it was as dense in its composition, and as near the sun, as the earth is at present; but it has gradually enlarged its orbit, at the same time growing, and purifying itself.

"All the inhabitants yet seen by me have light hair and blue eyes: blondes certainly predominate, and may be universal. I touch them, and realize that they are flesh and blood like ourselves, but lighter, and, like their planet, more largely constituted of refined and of imponderable elements. They have a stronger hold on life than we have, and live much longer than we do. One cause for this is, that the imponderable elements of which they are so largely constituted are eternal in their form of existence, making the whole physical being less subject to decay than with us.

"On the equator the people can float in the atmosphere with less movement or muscular effort than we make in swimming. They do not ascend to any

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great height: I have not seen them over thirty or forty feet above the surface. This power is not used as a means of travel, but as a recreation, and decreases with the increase of latitude.

"All the people I have yet seen are very beautiful, not only in the outlines of the form, but in the expression of the countenance: I have not yet seen one uncouth form. They eat less than we do."

MODES OF TRAVELLING ON JUPITER.

JAN. 5, 1870.

Mrs. Cridge's sixth examination.

"These people travel, and have tracks laid down. Their motive-power is electricity, which is generated by a very small apparatus. They travel noiselessly. The wheels of their vehicles are broad. The tracks are coated with a material resembling gutta-percha, which has the effect, I think, of much diminishing the friction, by means of its elasticity. The same apparatus, however, would not operate similarly on our planet.

"Jupiter is well populated; there being, in the equatorial regions, thousands of cities.

"In connection with their travelling arrangements there is a great feeling of *safety*. In addition to those vehicles above mentioned, running on prepared tracks, they have smaller ones, propelled by the same power (which is located just in front of the vehicle), and needing no tracks, and capable of going wherever a horse could go with such a vehicle. The wheels are low and small; and the material of which they are made is, *to the sight*, just like our iron; but, on

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handling it, the great difference in *weight* is realized. To the *Jovians*, however, it is just as hard and heavy as iron is to us.

"Now I see birds in flight that are as large as ostriches.

"The vegetation is green, and the foliage can only be compared to the most rich and beautiful spring foliage on earth: it is the beauty of tropical vegetation without its heat, with no indications of past or prospective decay, but showing an absence of the burning, scorching sun, and the presence of a mellow, nourishing, perennial warmth.

"Now I approach some learned men who have dived into the mysteries of Nature. Their heads are large. Now I find myself in a house, which, however, I am unable to describe. I am so disposed to float around, wanting to see every thing, that I see nothing thoroughly. I see some portions of a location at one time, and some at another. I see some things, and not others, in a place. There is not *complete* vision."

DWELLINGS ON JUPITER.

FEB. 10, 1870.

Mrs. Cridge's seventh examination.

"In the same city in which, on the preceding visit, I saw carriages of various kinds, I now obtain glimpses of large glass houses used for fruit-growing. This is in the northern hemisphere.

"Jupiter is generally not only well populated, but well cultivated.

"In a high southern latitude I perceive a locality,

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the climate of which is not very hospitable: it is like stepping into another world. The vegetation is generally scrubby, and invariably tough; the fruits few, and not juicy. The finer fruits cannot be grown there. The inhabitants are dark, hairy, of small stature, and impress me as being the last of an inferior race, to which the planet, in its present highly-advanced condition, is not adapted, and which now, in proportion to the aggregate population of the planet, numbers very few. These few are doomed to die out, as there are not in Jupiter, as there are here, the elements for the growth of such a race. They seem but a remnant of the past. I am not attracted to them.

"The bulk of the land is in the northern hemisphere. The continents, in several places, stretch far to the south in promontories, one of them reaching to the south pole.

"Though conscious, as heretofore, that the planet is thickly inhabited, I find myself mainly confined to one *city*, — if the use of that term may be permitted to characterize a locality which is unlike our cities in every respect but one. It is, I think, very near the equator. The inhabitants live very much in the open air, and are not troubled with storms. I infer the latter not only from the general character of the atmosphere, but from the structure of their houses, which is as different from that of ours as possible. They resemble beautiful *canopies*. I see no doors, no bars, no locks, no dividing-lines, no fences. They may be compared to enlarged summer-houses. The city is a beautiful garden: everywhere there is verdure, —

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trees, grass, flowers, lawns, walks. Appearances denote it to be a city of equals, where honesty and justice are paramount.

"There are large buildings. Now I am conscious of one quite high. I am conscious of its strength; yet it is so light, that on earth it would seem fragile. It is an observatory. They are making astronomical observations. To the lenses they use is added something not in our lenses, which increases both the clearness and the magnifying power: I think this additional substance is metallic. By means of their superior advantages in this respect, they are better acquainted with the sun, and the solar system generally, than we are.

"Science and intellectual culture are not, on Jupiter, restricted to certain classes, or to one sex; but men and women are equally interested. There, however, as here, woman is generally more spiritual and intuitive than man; but the two make one, and, by their junction, have accomplished *so* much! — the one supplementing the other, as, in many cases, the intellectual and the intuitive do here. There it is so in nearly all cases.

"They care less for money, and more for science and culture, than do the inhabitants of this earth. Science and culture constitute more of their life, their ambition."

ASTRONOMICAL INSTRUMENTS AND OBSERVATIONS.

FEB. 21, 1870.

Mrs. Cridge's eighth examination.

"The inhabitants have made great progress in astronomy, the knowledge of which is not confined

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to a few. The place near the equator, which I have several times visited, is a gathering of persons specially interested in that science. Those places that look like canopies are temporary edifices, made of metal, and covered with something similar to paint. They are very easily put up and taken down, are quite ornamental, and contain articles resembling chairs, tables, and lounges, but of more beautiful forms than similar articles here, and all of them *cast*.

"Some special astronomical observations are now being made; for which purpose the people have gathered, being of both sexes, women predominating in number. They are taller and more slender than average Anglo-Saxons, yet beautifully rounded. Blue eyes greatly predominate. Their necks are longer, and shoulders more sloping, than ours, — a conformation adding to the beauty of the women, but which I cannot say that I admire so much in the men. The mental temperament is uniformly predominant. Though so beautiful, so finely organized, and so highly cultivated and refined, they have a much greater hold on life than we have.

"Those canopies, pavilions, or whatever they may be termed, are erected among trees (both fruit-bearing and ornamental), planted with especial reference to such gatherings. There is no stiff uniformity either in the style or size of those edifices, which vary in the latter respect from that requisite to the accommodation of one or two persons to a capacity adequate to the requirements of fifty or a hundred inmates; so that any degree of privacy on the one hand, or of association on the other, can be secured. Some of

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them are circular, — not a plane circle, but with indentations. There is a very large fountain, throwing water two hundred feet.

"In the vicinity I notice numerous observatories. The place is located on a very high hill admirably adapted for astronomical purposes. Suddenly I find myself looking through one of their telescopes. At first the planets appear much the same as they do through our telescopes at similar distances; but, by a slight alteration then made, the planet is suddenly brought before one, so greatly magnified that the vegetation and the inhabitants can be distinguished. I looked through one of the glasses, and saw a planet to this extent; but, before I could note further details, the psychometric condition ceased."

ASTRONOMICAL CONVENTION ON JUPITER.

MARCH 1, 1870.

Mrs. Cridge's ninth examination.

"In one place near the north pole a point of land projects into the water, and almost reaches the pole. I again realize the very great predominance of land over water in the northern hemisphere as compared with the southern. Near the north pole I see snow falling. At a considerable distance from the equator, in both hemispheres, winds are common, becoming, in the polar regions, quite violent; while at the equator, and for some distance on each side, winds are unknown.

"So far as yet observed, their vegetation is much more enduring and longer lived than ours.

"The women are strikingly beautiful.

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"Now I am again in that place near the equator. I see the people all gathering in a beautiful place to take their meals, — all dining together, yet in groups, in one beautiful building. I see no indications of what we call *business*. The minds of all are directed to the observatories. Many are writing in their own pavilions. They write as fast as they talk. The writing is all curved. I see no marks below or above the lines. They use no ink, but write straight along. The writing is very clear, and exceedingly enduring.

"Pictures are taken of the planets as seen through their telescopes.

"Now it is night; and all over this place are lights. The illuminating agent furnishes a soft but very powerful light. They take those planet pictures by night. Some of them show the distribution of land and water on the planets respectively represented. Those first taken are very small; but they have a method of reproducing them on a larger scale, so as to bring out the details. Copies of those pictures are passed around among the people, who examine them with the deepest interest: they are evidently no mere spectators or curiosity-seekers.

"I perceive in their natures a love of fun. I see no traces of pecuniary anxiety. There is rest; there is freedom in a high degree; and there is a lively, inexhaustible, ever-present interest in that which is truly scientific. *Play* enters more into their life than into ours; the playfulness, buoyancy, and mirth of childhood being but little diminished even when old age creeps upon them. From all their greatness and their wisdom, they are not ashamed to descend (if

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descent it can be called), and become as little children.

"I am as yet uncertain whether this place is a gathering of *savans*, or whether it represents the usual life of the people. I am rather inclined to the idea that it is a convention of persons interested in science, always in session, and always open to any person.

"There is here an entire absence of parade and of elaborate ornamentation: the beauty so all-pervading is obtained by ready and simple means.

"The robes worn by the ladies are each composed of but one piece, except the sleeves, and fastened by a girdle. They are easy, flowing, and free from any thing elaborate: yet nothing about them indicates any thing like carelessness, neglect, or lack of refinement; on the contrary, every part of the countenance, and every movement of the body, expresses refinement, polish, grace. Looking at those people, it may be said that the ideal and the real are wedded."

A GENERAL VIEW OF JUPITER.

MARCH 5, 1870.

Mrs. Cridge's tenth examination.

"I see again the same small vehicles, capable of holding one or two persons, previously described (see Ex. 6). In front is something cylindrical in form, three or four inches in diameter, and in length equal to the breadth of the carriage. This evidently contains the motive-power, as the carriage moves or stops promptly by touching this apparatus on one side. No animals of any kind are used for draught or carrying.

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"I am again in the place where there are so many observatories. I recognize some places that I saw before, and also see some strange faces. I ascend one of the observatories: it faces eastward. I do not understand what its occupants are doing; but they are very busy. Much apparatus connected with telescopes is being used. I look through a telescope, and see a planet; and I see a very large and high mountain, which looks like that I saw in Mars: I believe it is the same mountain. On further observation, I feel confident that they are examining the planet; but they can only see half of that mountain. It is astonishing how much these people know of the other planets.

"The common dress for men is light in texture, and fits somewhat, but not closely, to the form. For dress occasions they wear loose, full garments.

"I perceive that they are again taking pictures of their planetary observations.

"Still I linger, linger here, as if there was something to be learned of especial interest. Concerning the botany, geology, or agriculture of the planet, I know almost nothing. Sometimes I float off, and just begin to catch a glimpse of its geography; and then it is gone.

"There are some thousands of people gathered here: but I see no children; not one. Every thing indicates that this locality is a place to be *visited* by those especially interested in astronomy and kindred sciences; the present being a time of peculiar interest there.

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"The outlines of the land are decidedly picturesque, abounding in indentations, beautiful rivers, and small lakes. Now I hover in the atmosphere, and see the planet as it revolves; keeping myself stationary in reference to such rotation: thus I obtain a view of a large portion of the planet at once; and, by moving myself, I see the whole."

THE PEOPLE OF JUPITER FLOATING IN THE AIR.

"Now I again approach the surface. I see people in a location some distance west of the astronomical city, and a little south of the equator: in this location it is not, I think, as warm as in the city, which is but very little north of the equator. Some of these people are floating in the air for amusement, at times cautiously venturing over the water; but the majority do not run that risk. In this exercise many of them are very expert, appearing to move as easily as on land. They are very graceful in their movements. I have seen nothing uncouth among any of them.

"The water is not salt. I now see animals, some of which come up out of the water near the land.

"I now go to a place considerably south of the equator, on a point of land stretching far into the ocean. The climate is somewhat cold. For the first time I see children, a number of boys and girls, who are dressed in thick clothing, — apparently woollen, — and enjoying themselves very much playing. Some things resembling logs of wood are floating in the water; and the children are jumping from one to the other, exhibiting much merriment. There

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is great simplicity in their style of dress. The boys are dressed in dark clothes, and the girls in light."

DAILY LIFE OF THE JOVIANS.

MARCH 18, 1870.

Mrs. Cridge's eleventh examination.

"To-night I am rather longer than usual in reaching the planet, and can, while on the way, look back and see the earth and other planets.

"I am to-night more *en rapport* with the people than I have ever been before, having a more realizing sense of human spheres and of every-day life. The people are not so frail as we are: they are less 'of the earth, earthy,' and partake more of the spiritual; which to-night, as I never have to the same extent previously, I feel to be the more real. Some of them are inclined to the idea of a Supreme Being. I find in them a sentiment of veneration, of devotion; and yet not an ignorant, dark, blinded devotion, but that which is tempered by an acquaintance with Nature. I do not perceive this by observation of *individual* natures in succession, by special observations, but by sensing the aggregate of human spheres.

"There is so little of the spirit of avarice, grasping, trading, and so much of refinement, culture, and rest!

"And now I find myself in a dwelling. I see a baby asleep. The period of pregnancy is longer than with us, and the children arrive at maturity more slowly. This baby is fair; has a most beautiful profile, blue eyes, and an exceedingly white skin. I begin now to see their faces more clearly. They are much whiter than we are; but it is a healthy, not a sickly whiteness.

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"I am now much farther westward than the place where I saw the astronomical convention. It is daylight. I am in a room: it is constructed beautifully, but simply, and devoid of elaborateness. On the east and west are large door-ways, the upper portions of which are circular: they are closed, when desired, by *slides*, not hinges. On the north and south are two large windows.

"In this room is the child, laid in a cot, provided with something at its head to shelter the occupant from draughts, &c.: it somewhat resembles a cradle. There are women; but, as I cannot describe them in detail, I will go elsewhere.

"I see a large number of rooms connected with each other, yet some or all separated from each other by short halls. In this building is a great number of people, all of whom are perfectly private. The front of the building is an arc of an ellipse in its general outline: that portion of the ellipse not occupied by the building is a large garden, below which is a river. The building is broader and higher in the middle than at the sides."

BUILDINGS AND GARDENS ON JUPITER.

MARCH 19, 1870.

Mrs. Cridge's twelfth examination.

"The forces that so operate on planets as to cause them to move on their own axes have freer action on Jupiter than on this earth, by reason of the smaller specific gravity of the former. I come into *rapport* with those causes, but have not learned their essential nature.

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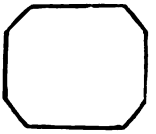
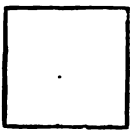
"I am again in the building last described. There are no sharp corners: right and acute angles are carefully avoided. Where, in our style of building, two walls would meet at right angles, they would insert at the junction a short side to cut off the corner; thus

 instead of 

The same peculiarity is observed in their architectural ornaments, which are by no means elaborate, and are frequently curved; but it does not appear in the *interior* of their rooms, which are like ours in form, except the door-ways.

"The middle portion of this building is higher and broader than its extremities, these being but one room in width, and one story in height; while the central portion is three stories in height. In this place are several of those buildings adjacent to each other, similar in architecture, and arrangement of grounds; that portion of the transverse diameter of the ellipse which is near one extremity passing through the centre of the building, and terminating at its front.

"I descend to the garden, in which there are beautiful walks. The combination of elegance with simplicity in every thing here strikes one most charmingly. I see there are divisions in the land, and more buildings like this, which is apparently the style of the large city here located. The fences dividing the grounds from each other are white. I can pass readily (psychometrically) from one building to another. There are no limed or papered walls. The inner walls are composed of dark wood the color of walnut. The halls are large, and ornamented —

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as are the rooms — with what appears like carved work; but the style is not elaborate. The walls and recesses are inlaid with mirrors; and every thing in the furniture and adornments of those rooms gives one a feeling of rest.

"The staircases are broad; the windows each composed of one very clear, thick, perfect piece of glass.

"I see a girl apparently about five years of age: she is exceedingly graceful, beautiful, and light. The grace of motion in all these people is remarkable.

"At the lower part of the grounds, near the river, I observed means of communication with adjacent grounds, consisting of divergences from the walls, and a sort of bridge; but I could not see whether those bridges were over water or not."

THE EQUATORIAL REGION OF JUPITER.

MARCH 23, 1870.

Mrs. Cridge's thirteenth examination.

"I see that the astronomical convention is still in session. Two moons are visible; and a third is just setting. In apparent size, as viewed from the planet, one is much larger than our moon as viewed from the earth: the other is of about the same size as our moon.

"The people of the convention all look peculiarly happy: they are on the *qui vive* about something.

"I now go westward. There is a feeling of great repose in that part of the planet extending from the equator to about twenty-five degrees north and south. I still go westward. Here is a beautiful country; on the whole, elevated: it is diversified by hill and dale,

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resulting from the action of streams, and, in addition, dotted over by thousands of small, rather abrupt mounds, somewhat conical in form, and from thirty to one hundred feet in height.

"I still keep westward (in the northern hemisphere), and at length reach a chain of high mountains extending from north-north-east to south-south-west. Passing over these, I reach a valley, or plain, extending in length fifteen or twenty thousand miles, and perhaps two or three thousand in breadth, and not much diversified in regard to level. In its very heart, and about equidistant from equator and north pole, quietly sleeps a very large lake. On the west, this large valley, or plain, is bounded by another chain of mountains, running nearly north and south, — a little east of north, and west of south. This brings me about one hundred and fifty degrees of longitude west of the astronomical convention.

"At the equator, and for some distance on each side, the vegetation is of a brilliant green color, varying in shades from dark to light; but, as the latitudes become higher, there is a gradual change both in color and texture, the green being of a yellower tint."

LADIES OF JUPITER.

MARCH 25, 1870.

Mrs. Cridge's fourteenth examination.

"There have been volcanoes which have left outward marks; but, at present, few remain.

"I see some ladies with hair reaching to their waists. For beauty, it hangs loosely; that is the cus-

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tomary manner of wearing it: but, when that is inconvenient, it is loosely plaited, and hangs down. Ease, repose, and a charming simplicity, find expression in every thing connected with these people. The dress is loose, and entirely unconfined, excepting that, in some cases, there is a loose girdle around the waist."

LANGUAGE AND AMUSEMENTS OF THE JOVIANS.

APRIL 22, 1870.

Mrs. Cridge's fifteenth examination.

"As the tone of the voice indicates with us the nature of the emotions which affect the speaker, or the character of the subject of discourse; so the words, the language, of the Jovians, accomplish, in a higher degree, the same end. Simple subjects are usually expressed in words of one syllable; while compound ideas multiply the number of syllables, with some reference to the complexity of the subject. The language there, like languages with us, has a *general* character running through nearly all the words of which it is composed. The sounds are liquid, rippling, mellow, and musical; but the language is by no means wanting, in forcible, energetic, and compact sounds, to express corresponding ideas, or to use in connection with subjects of a corresponding character.

"To-day there is a hazy appearance in the atmosphere; and the warmth, as it lingers in the atmosphere thus affected, is very agreeable.

"Woman here is equal with man, yet different from him. Men are larger than women, but have a

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like fineness of physique, and are nearer to women in the development of the intuitive faculties, and in other respects, than on this planet.

"The proportion of births to the population is less than with us. The period of gestation is longer; but children require much less attention after birth there than here.

"Several times I have seen the people sailing on water. They are very partial to aquatic amusements, including bathing. They manage their vessels very dexterously, and sail them much more rapidly than we do. I see some of them bathing in the ocean. I see vast numbers of the most beautiful shells of all sizes, and of numerous species. Some distance from the bathers, I see fish in the water.

"They use no animal food; not even fish."

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CHAPTER III.

MISCELLANEOUS EXAMINATIONS.

THERE are in this country thousands of persons — women, men, and children — who could exercise the psychometric faculty to advantage, if they only knew how to take advantage of the powers that they possess. Some would succeed best in describing and delineating extinct life-forms: others would succeed well, as many are doing, in describing the internal condition of diseased persons, sensing in themselves, by their sympathetic connection with the disease, whatever peculiar condition might exist. Some would succeed best in describing the heavenly bodies and their occupants; while others might most easily describe the earth's interior, and the position of the valuable contents of her veins. Some see and feel but little; while others feel so acutely, that it is almost impossible for them to examine any thing whose history has been particularly exciting.

One of the most sensitive psychometers that I have met with is Mrs. Clapp of Weymouth, Mass. Her husband, W. W. Clapp, as an experiment, gave her a piece of pumice-stone to examine, and wrote down what she said at the time, and forwarded it to me. She saw the specimen, but did not know its character.

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PUMICE-STONE.

"I hear a roaring noise in the distance, but do not see any thing. Now I am in the water, and it is pouring on me like a waterfall. I feel very quiet now, as if in an eddy. Now the water is rushing against and over me, and is very cold, and produces a suffocating sensation. I am moving down stream, — moving along. Now I am stopped, now moving, now stopped; and the water is pouring through every pore, and out of the ends of my fingers. It is not very deep here; but in some places it is very deep. I stop in shallow water; and then I see a great many pieces like this in kind, but very much larger. I think this must have been formed in the water.

"Now I see a waterfall: it is splendid. The water is pouring down from a great height over a precipice, which is almost perpendicular, — one of the most beautiful sights I ever saw. I am moving from it now. I was close up to it at first, and occasionally get stopped; and then it is that I see large stones like this. Sometimes I can see over the surface to the very edge; and then I go down where there is nothing but water around me.

"It begins to grow warm now: and I feel a kind of suffocating feeling again; only this time it is from heat. Oh, how hot it grows! and how hot and dry the air is! I am almost scorched. Oh, dear! I am hot, and falling. I am in the midst of a shower of stones and ashes. I shall have to give it up; for I am so parched and thirsty, I shall die.

"I see stones coming out of something in the dis-

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tance: they bounce when they strike the ground. Now I see: it is a burning mountain, a volcano! Oh, it is terrible! It is so hot, I can't endure it any longer. I don't get any nearer; but the air chokes me where I am. I am moving on now, and am nearing the volcano, where I see a great deal of rock like this.

"Now I am going round to the right, or what appears to be the west side of the mountain: as I go round it, I see some very large pieces. Now I am amid smoke, I think; for it seems thick and hazy, with something that almost takes my breath. It is so hot here, it seems as if I should parch.

"Now I am going up, up, up. Oh, such a feeling! How bad the air is! Oh, dear! I am fainting! Get me some water! — quick!"

"At this point," writes Mr. Clapp, "her hand fell lifeless at her side, and it was with difficulty that I restored her to a normal condition. She felt as if she was in the air some little time after she was able to speak, and did not get entirely over it until the next day."

Had the history of the specimen been known, it would have confirmed the accuracy of the examination in every particular, I have no doubt. After the stone was ejected from the volcano, as it doubtless was, it seems to have been washed down some stream. The latter part of its history comes up first.

EARLY TERTIARY TIMES IN VERMONT.

In February, 1872, Mrs. Clapp examined psychometrically a fragment of lignite from Brandon, Vt.,

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knowing nothing of the character of the specimen. She said, —

"I feel a cold draught all over my arms. How large I grow! I am very large, and increasing. My arm is so heavy, I cannot raise it. I feel a cold draught over me all the time. I feel a motion, but do not see much. It seems as if I was going through the air, it is so chilly. I am so large!"

On questioning her after the experiment, she said she felt like a tree, — half as large as the room. Her arm grew faster than her body, and seemed to be a great limb swinging in the wind. "I had a glimpse of other trees not so large. Had a sensation of dampness like that of a fog."

A few days after, I received from Mr. Clapp the following, with a note, in which he wrote, "I give you this experiment almost in the exact words, so that you may get at the truth." The same specimen was tried, neither of them knowing the character of it; though the previous examination, and the appearance of the specimen, may have suggested its vegetable origin.

"I feel a cold draught going over my hand; and it seems as if I was waving through the air. I have that big feeling coming again that I had the night that Mr. Denton was here, when trying this same specimen. The air seems warm now.

"Oh, my arm is *so* large! and it aches to my shoulder. I feel a draught all the time. When it first strikes, it seems cool, but grows warm at once. I am growing very large: my body is monstrous.

"I hear a rumbling sound: it struck my right ear

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first. Oh, what a rumbling! And there is a terrible gale, a perfect tornado. It rumbles awfully. It almost jars me. There go some trees over! Oh, how the ground trembles! There! — off goes one of these pieces! Oh! I see the trees come up by the roots.

"Now I am up in the air, — away up. I cannot see any thing but mist. And such a blow! It seems as if I should fall over myself. And then there is such an awful roaring like thunder under me! Thunder is no name for it: it sounds as if the world was tumbling to pieces. It feels damp and chilly up here.

"I am so tall and so large now! It is hard to breathe. There is a tendency from beneath to uproot me. I hear the rumbling all the time. Oh! I am falling over. It gives me a terrible shock."

(Turned the specimen over.) "I can see a great tree that is canted over, and the limbs touch the ground, and others that are smaller than this. The climate is congenial, — mild and pleasant. Should think it was autumn; for the leaves look old and tough. Some of the trees look like elms; but I do not think they are. I do not see any signs of inhabitants. (With the specimen this way, I feel natural.) I can hear birds sing delightfully, but do not see them. I feel it sprinkle; yes, it rains: and the birds make a noise as if frightened.

"The rain makes me feel cold in spots when the drops strike me; and the wind is blowing hard.

"I caught sight of a bird: it looked something like a robin, but had a longer bill. Now I see a great many of them on the ground picking.

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"It is done raining now: it begins to look beautiful. The sun has come out: every thing is wet and sparkling, and the air is sweet and fragrant. The climate is delightful here. The sun is very hot; and my face feels as if it was sunburnt. The shower came quickly, and went as quickly as it came. This is a good place to study Nature in. No fear comes with these surroundings. There are trees all round, and some rocks."

(Changed the position of the specimen again.) "I feel as if descending. I have got away down to the ground. Now I am in the dirt beneath the surface. I seem to be pushing along, and strike a stone occasionally; and that changes my course: it is hard work. Have grown a good size now.

"Now I feel a waving sensation, and jarring, and hear rumbling. Am nearer to it than I was at first. There is an inclination to force me up. I can hear the roots snapping and tearing. I am squeezed by the force below against the dirt on top of me. There is a tremendous shaking that loosens every thing around me.

"Now the noise gradually subsides: it grows calm and quiet now."

"At this point," writes Mr. Clapp, "she became suddenly unconscious;" and she did not recover her normal condition for about an hour.

The most remarkable experiences in the history of the tree seem to have been presented to her, while she seemed to be, part of the time, a branch, then the trunk, and, lastly, a root of the tree. The tree, of which the lignite was a part, had, in my opinion, been

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exposed to some terrific tornado blast accompanying an earthquake; and they had left their impress upon every part of its structure which the sensitive psychometer was able to feel.

AN EGYPTIAN FUNERAL.

In June, 1873, I sent to Mr. Clapp a fragment of a date taken out of an ancient tomb in Thebes, Upper Egypt, having first whittled it so as to destroy all appearance of its organic character. The specimen was about as large as a grain of pop-corn. I gave Mr. Clapp no idea of its nature; and I regard it as impossible that either could have obtained, by the exercise of their ordinary senses, any clew to the locality from which it was taken.

In a few days I received from Mr. Clapp the following: —

"I can see something in the distance that looks like a great hole or door. I cannot see very plain what it is. Do you suppose this is a cave that I am nearing? I can smell a very bad odor from it, that makes me feel sick.

"I think this must be a tomb. I see something that looks like a cross, only the ends of the horizontal part drop like the ends of the letter T." (She drew the shape of the cross as represented by Fig. 107.) "I think it is a religious emblem. The entrance is rough-looking. There is another door, or opening, on the inside of the first one, and a candle burning.

"I can see coffins, strange-looking, and different from ours in this country, — very narrow at the foot, and broad at the shoulders; and at the foot on the

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end is that strange cross. They look as if they were made of some kind of metal. They are black, and do not show any signs of decay. There are a great many in here, all on shelves; and they look as if they were taken good care of. The upper part of the tomb is trimmed with twigs of some kind of green tree, — emblematic of immortality, I think.

"Here comes a procession all dressed in black. Eight men are carrying a rough-looking bier, and on it a coffin, covered over with a black cloth. They are clad in priestly-looking robes, peaked crape caps, and black tape-strings tied round the right ankle of each man that carries the bier. They have placed it in front of the tomb, and are all looking down on it. There are some more waiting at the entrance, or gateway, close by two large stone posts. Four of the eight have each placed a green twig on the coffin, — two at the head, and two at the foot. Now the other four are tying a piece of something black on each twig, and are making motions over the coffin, — bidding it adieu, I suppose.

"Now the rest are marching up to the tomb, and are forming a line on each side of it. Each man places his right hand on his heart, and his left on the side of his cap.

"The eight now carry the coffin into the tomb. They go round the candle, and place the coffin on the ground behind it. The eight are now bidding it adieu in the same manner as those at the entrance, waving their hands from their heads toward the coffin. This is a large tomb.

"They are all going out; and the rest have joined

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the eight with the bier. I watch them moving along in the distance. Now they are ascending a flight of six stone steps into a rough-stone building. They have all gone in; and I am following.

"I am in, and can see the interior. There is a seat all round the hall, boxed down to the floor. It is a large hall; and on the sides there are desks, or something that looks like them; and in the front, opposite the entrance, there is an altar, or speaker's stand; and in front of it a large box. They all march up to it, take off their mourning-regalia, and place them in it. They untie the tape on their ankles, and place that with the rest. They have divested themselves of all signs of mourning, and disappeared.

"These men are not very dark in complexion; very near the color of mulattoes."

Mr. Clapp adds, "This is nearly word for word as she gave it to me."

I have made a very few verbal changes, but have not interfered in any way with the sense, nor made the slightest addition.

After receiving the examination, I wrote to Mr. Clapp, requesting him to obtain from Mrs. Clapp the shape of the coffin that she saw. I received in reply the outline of Fig. 107, which is identical in shape with some of the coffins used in Egypt, but differs considerably from any used in modern times among us.

Some persons might regard the funeral as a very modern one, on account of the presence of the cross; but the cross, as archæologists know, was a sacred emblem in many countries long before the advent of Christianity. There is no form of the cross in use

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at the present time that cannot be traced to a remote antiquity. Among the Egyptians, the cross was regarded as the emblem of life, and was therefore indicative, when placed upon the coffin, of the belief of the survivors in the continued existence of the deceased. The particular form of the cross seen by Mrs. Clapp, though resembling the common cross of Egypt, is somewhat different from any Egyptian cross that I have seen.

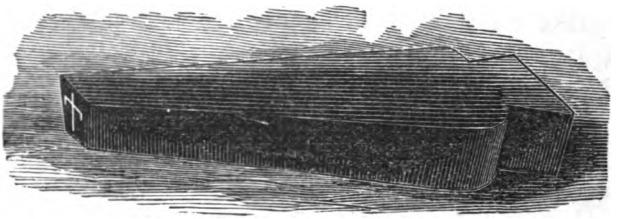

FIG. 107. — Ancient Egyptian coffin.

The funeral that she describes seems to have been connected with the burial of a member of some sacred order; and differs, therefore, from the ordinary Egyptian funerals. The complexion of the Egyptians is very well described, as being "very near the color of mulattoes."

The gentleman of whom I obtained the date took it out of a jar in one of the ancient Theban tombs; and it cannot have been less than about two thousand years old, and may have been very much older.

MAMMOTH CAVE.

With regard to some of these examinations, it will be said that the statements made are such as would

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be appropriate to many different specimens; and of some this is doubtless true: but I think it will be seen that the following is true of but one known place, — the Mammoth Cave. When sailing on Echo River, in that cave, I dislodged from the rocky ceiling a small cup-coral, which Sherman examined in November, 1866, with no knowledge of it except what he might have obtained by seeing it.

"It seems to be all dark: no, not quite dark. It is underground; and there is rock over my head. I have to stoop in places. I can see where light comes in. There is red rock by it. I see roundish holes, with shining things in them. The place looks as if somebody had been to work. It is a good deal wider than it is tall.

"There is a place I go down into, where there is a brook running and foaming through the rocks. It has cut its way right down from the top, I think. It is not a small brook, either. It goes foaming down. I am following the stream. It empties into a large pond, or something of the kind; and that empties into another stream. The land is away above me. The rocks are dripping. It is all solid; but there is some coral-looking stuff on the walls.

"That stream goes away down, with six or seven falls, into a large, broad place. I cannot see the other side of it. I can see the gleam of the water, and the circles made by fishes as they jump up. It is very, very still here, and all I can hear is these fish. There are many crooks to this stream, and sometimes it goes away round.

"There are some animals in the water here that I

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"We cannot see the sky. Every thing seems so chilly and damp and dark, and our voices sound so hollow! We had to come a long way in wagons to get here. There is no railroad near (4). Oh! this is such a large place, it would take a great while to explore it. No one dug this: Nature made it. I see a place away up high with a little bridge across it."

(1.) From Boston, where the examination was made, Mammoth Cave is due south-west.

(2.) She probably refers to the stalagmitic matter which collects upon the walls, and frequently has a moss-like appearance.

(3.) The river that she observes is, I think, Echo River, from above which the specimen was obtained.

(4.) This is a very singular statement. I fancy that she must have come into *rapport* with the condition of some party at that time visiting the cave. There is a railroad within a few miles of the cave.

THE ADELSBERG CAVE, AND HOW IT WAS FORMED.

A friend presented me with a piece of a stalactite from the famous Adelsberg Cave in Germany. I broke off a very small fragment, and gave it to Sherman a few months ago for examination. He knew nothing whatever regarding the specimen, which, he told me afterward, he supposed was a piece of quartz.

"I seem to be in some dark place: it may be a cave. It seems to be an old cave where there have been animals; for I see their bones. It is a stalactite cave. The stalactites are very pretty and slender.

"In one place I see a bone sticking out of the side of the cave, that has been slightly covered with

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rock by water dripping; but I can see the complete form (1).

"There are many bones round here; some as large as a rhinoceros's bone. Water comes down pat, pat, quite hard, and echoes. I can hear it dropping all round. I like it better than that dead stillness that I have noticed in some caves.

"This place is all divided. There are small holes that you can pass through into large chambers. Every thing looks as if it had been done by the best of workmen: it is all beautiful.

"Oh! I see a place immensely deep. There is a chamber, and one side of the floor seems cut away; and there is a very deep place, with a little water at the bottom. I can hear water rushing that I do not see.

"It would be a hopeless position for any one down there. There is a small hole through from there that goes under the chamber.

"I do not suppose that I could find the place where I started from, I have gone round so. In some places the roof is very low, and in others very high. The floor comes up, and nearly meets the roof in some places.

"In one place I see a hill that shines white as if it was covered with snow.

"I see a singular stalactite here. It seems to have been attached, and then broken. (Draws Fig. 108.)

"This seems to be some time back: it is not the present time." ("Why do you think so?") "I cannot tell: only I have that kind of feeling.

"I can hear water almost everywhere.

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"Some of the stalactites are so fine, that they seem like glass; as small as icicles of the same length; and they are quite white and beautiful (2). The water keeps dropping off the ends of them.

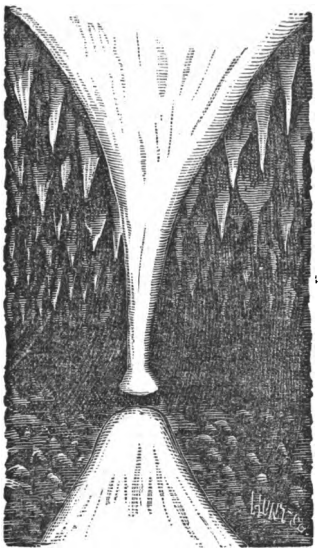

FIG. 108. — Stalactite and stalagmite.

"Now I see something very pretty. I came to the end of a floor, and looked over; and there was a river, about twenty feet down, rushing along quite furiously. If that river should go lower, there would be a room under this. It was running out from under this. As the river goes on, the ceiling gradually approaches it till it almost touches it (3). I put my hand against the rock, and felt it ridgy, as if the water had chiselled it out.

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"Where I am now seems like a new room: the stalactites are not more than two or three inches long."

("Can you go back, and see how the cavern was formed?")

"Well, as I went back, I saw the river rise, till it came up and filled this room, and was rushing through here.

"I see another curious thing. The water has left a rock hanging between two rocks. I will draw it. It is very large, — five or six feet in diameter. (Draws Fig. 109.)

"As I keep going back, I see the water gradually rise and go into a chamber above this. The rooms below must be solid rock.

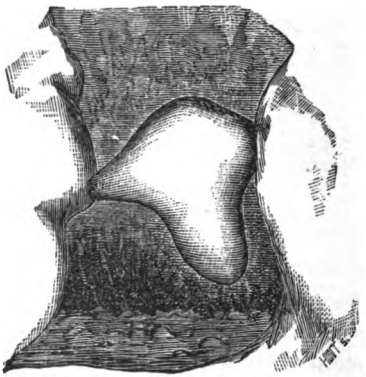

FIG. 109. — Hanging rock.

"Now I must be near the beginning. I see a good-sized stream running along twenty or thirty feet from the surface, nearly straight.

"I can see how it wore the cave out. It struck

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the rock on one side, and ate the rock away; and then dashed over to the other side, and wore away there; and kept sinking all the time. The top is quite smooth: the stalactites made it irregular afterwards. This rock must have been soft, I think (4).

"I see how the bones got in here. It was by the stream floating in dead animals that have been washed from above. I can see them floating round, — a very large bear, an animal like an opossum, with a long tail. It is a pouched animal. They catch in crevices, and stay there.

"Here is a large dead reptile, about five feet long: it is not a crocodile. It is peculiar, and partly decayed; and I cannot get it exactly right. (Draws Fig. 110.) There are scales on it very large in proportion to the size of the animal."

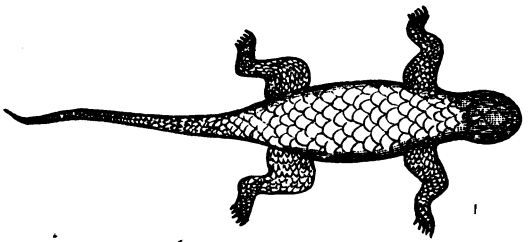

FIG. 110.—Reptile in Adelsberg Cave.

(1.) Fossil bones incrusted with stalagmite have been found in this cave.

(2.) Speaking of a portion of this cave, Reclus says,* "This portion of the grotto, *which appears to have been the former bed of the Poik*, . . . affords won-

* The Earth, p. 257.

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derful groups of stalactites, especially in the Salle du Calvaire, the vaulted roof of which, having the enormous span of two hundred and ten yards, has dropped upon a hillock of *débris* a perfect forest of stalagmitic columns and white needles."

(3.) When this examination was made, I knew but little more than the name of this cave, and could not have told whether there was a river in it or not, still less whether it was "rushing quite furiously;" but Reclus says of this cave, it "is especially curious on account of its size, the variety of its calcareous concretions, and the torrent *which runs roaring through it.*"

(4.) That the cave was formed in this way there can be very little doubt. Hartwig says, "The Cave of Adelsberg is a remarkable example of the changes which the subterranean waters, aided by time or by the disrupting power of earthquakes, may thus bring about: for the Poik now flows beneath its galleries in the same north-easterly direction, in a channel which is for the greatest part unknown and inexplorable; so that the dry cave of the present day must evidently have been the old river-bed." *

He supposes that the rock was softer when the eroding process was going on; but this was a mistake.

THE SIEGE OF GIBRALTAR.

About four years ago, Sherman, looking at "Hume and Smollett's History of England," saw a picture of rescuing Spaniards before Gibraltar, and said he should like to have seen the fight. Said I, "You can;"

* The Subterranean World, p. 138.

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and, taking down an inkstand made of stalagmitic limestone from Gibraltar, I handed it to him. He placed it to his forehead, and said, —

"I hear the guns going 'bang, bang!' It is not much like the picture, though. I see a great many ships. I see the men on the rock loading the cannon, and touching them off. I see the people falling into the water, and hear the ships split and crack as the balls go into them. The balls are hot too, — red-hot as they put them in. I see a little ring of smoke whirling around the ball as it goes. I see one ship tip right over: the sails are dipping in. Men are yelling, and jumping into the water from some, the blaze is so near.

"One ship is nearly full of powder: it has just exploded. The men in the ships have got the worst of it. The cannon-balls are going fast. One cannon has burst in pieces; but I don't see anybody hurt. The water is thick in some places with men swimming.

I see one ship sinking down at the back; and the front part is sticking up. I hear the brands hiss as they fall into the water. I see another ship blow up. A red-hot ball went through the side into the powder-place.

"I see no women. That picture is nothing to it. I am standing where the cannon are. Now another ship has exploded. What a loud noise it makes! It made me jump.

"I see men picking them up, — pulling them out of the water, all wet. One boat full has gone to the shore. I see several little boats now.

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"The cannon have stopped; but I hear the burning logs hiss yet. They take the men to one side of the rock, to a large house. They have loaded their cannon all up so as to have them ready.

"With this other side I seem to be two or three miles off. I see the hump, or hill, and the long strait of water, and the flat place where the cannon are.

"I am close to it again. I see logs floating still; and it smells of gunpowder. If the man had seen it, he would have drawn it better."

(In answer to questions.)

"The cannon-balls were put in with an iron thing that the balls fit into, and fixed with a rope. They swung it, and it hit on the end of the cannon, and rolled in."

The celebrated attack on Gibraltar, to which the engraving refers, took place in 1782, when the combined French and Spanish fleets, consisting of forty-seven sail of the line, ten battering-ships, and fifteen gun and mortar boats, opened their guns, and poured in their broadsides, doing much damage. The defenders resorted at length to red-hot balls; and, after some hours, the ship of the Spanish admiral was in flames, every one of the batteries was finally burned, and the Spaniards lost at least two thousand men. The British rescued many of the Spaniards who were in danger of drowning in consequence of the destruction of their vessels. It might be supposed that I had given Sherman some account of this previous to the examination; but nothing had been said beyond the merest mention; and it was not until the examination was over that I knew that red-hot balls were

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fired by the British into the vessels of the attacking-party.

SAVAGE MAN IN EUROPE.

Many representations of primitive humanity have been given in this volume: but one of the most interesting, and one that represents man at a very early period, I neglected to insert in its proper place; and I therefore give it here. The specimen is from Switzerland, near Lake Concise, and was examined about four years ago.

"I see a large lake: I am near it. The bushes grow into the water all around it. It is very muddy. A very large mossy rock sticks up above the trees in a swampy place."

("Find the people, if you can.") "I see one poor fellow now: he is walking along. Now he sits on a rock, and is throwing stones into the lake. He has long hair, especially under the arms. He looks a good deal like a monkey. His mouth sticks out. A monkey in a tree is mimicking him. He gets mad, and throws stones at the monkey; and the monkey throws at him. The man is of a brownish color. He has no beard except a few bristles; but his body is hairy nearly all over.

"The monkey hit the man on the face, and he has not hit the monkey yet. Didn't the man jump! He went back up to the middle in mud, and saved himself by a branch. What a figure he is! He is running now. He wades into a pond where it is sandy: he swims dog-paddle way. He is a good swimmer. He dives, and goes quite down to the bottom. I can

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see him: he is diving after fish. There are fish that swim slowly like a turtle. They dive into the sand; and he puts his hand down, and catches them; and I see him now swimming on his back, and eating them." (The specimen was a mere fragment; and it slipped out of his fingers, and could not be found. However, on taking another fragment, he was able to continue the description.) "Now he is diving again. After he catches one, he touches the bottom with his feet, and jumps. I can see him from the top of the water: it is clear. As he swims, his eyes are under water most of the time; and, as soon as he sees a fish, he dives. There is a kind of flat-fish that goes sideways into the sand. He eats them as fast as he catches them. He swims very easy. He is going to the land. Now he is out, and is going on, scratching himself. He saw an animal about the size of a squirrel run into a hole; and he is digging after it with his nails, like a dog. He has got it by the tail, and is pulling it out. It tries to bite him. He twisted its head round; broke its neck; and now he is eating it. He relishes that more than he did the fish. He is sucking the blood out, and drinking it: it twitches while he eats it. He has eaten it all but the skin and bones. He goes like the chickens when their crops are full.

"The muscle on his arm is as large as my two fists. He acts as if he was drunk, he twists about so. He takes a big stick with thorns on, and scratches himself, and rubs his back against a rough-barked tree, like a pig, till he is satisfied. He is short and stout, broad-shouldered and strong.

"He is going through bushes to a miserable hut

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underground. It is a nasty place, made of sticks, with mud plastered over it. There are twelve or thirteen in there, and he is talking to them. They make a great many motions. There are three little children, and five women. They have stones to sit on, and dry leaves to lie on. They have something to dip water with: it is made of clay, baked in the sun, I think. It does not look burned. The climate is very warm, hot."

CHURCH OF ST. CLEMENTS, ROME.

The following examination by Mrs. Denton of a fragment of marble from the Church of St. Clements, the oldest church of Rome, will show what a wide range the psychometer may obtain from a specimen, and what an accurate analysis of the character of a people may be obtained from the dumb rock. Specimen entirely unknown to her.

"I see a steeple, — now several, — a dome, and towers. I see a city. I seem to be up where I am looking on the tops of buildings below. I am on a level with the tops of some, and below the tops of others.

"I think it a city or large town among hills. It seems to be a pleasant, hilly country, not mountainous. There is a stream here, and buildings on both sides. There is quite a valley here.

("I seem more inclined to examine the natural than the artificial condition of the place.)

"There is a high state of cultivation among the people in certain directions." (Long pause.) "They seem to me to have reverence, devotion, and ideality

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unusually developed; but I cannot tell the direction they take. They affect their government to some extent, and, I think, their religion. There is a strong disposition to look after the interests of this place, and of all connected with it.

"There is a large region that the people of this place are connected with, and have great influence over. I feel this influence extending to other places at a great distance; but it is not so absolute there as here: I mean it is interrupted there by other and often by antagonistic influences. This may be the place where the government of the country has its seat; but the religious ideas of the people are associated with their ideas of government and of the administration of government.

"I have before felt an influence similar to this. They must be quite a religious people.

"I look over the country, and see roads winding about among the hills, and converging here. It seems to be the centre for a great extent of country, like a place of particular interest to the people of a large territory; and people in distant countries seem to feel themselves connected with this place by their religion and by their ideas, if not by their forms of government. It is at once the governmental and the religious centre of a large people. Connected with their regard for this place as a centre of, at least, their political and religious life, is a feeling of intense devotion and of unshadowed illumination, as if here, without any shade of doubt or any possibility of question, were at once the light and the hope of the whole world. They seem to have considered

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themselves immeasurably removed from all other nations and peoples. As a people, their faith in their own as being the true mode of worship is the most implicit conceivable. They do not seem even to suspect the possibility of there having been any mistake in this particular.

"There is here a great deal that is rich and imposing in architecture and in all the regulation of public affairs. I cannot divorce the government and the religion: they seem to be one. I think of no place but Jerusalem where this is so; and yet, in some respects, it does not seem at all like Jerusalem.

"There is here a feeling as of constant care and of untiring effort, like the care and effort requisite for the regulation and maintenance of order in a family (only in this case it is over a people), as if to them had been delegated supervision over a whole country.

"I think this is a large city. I feel an influence that makes me think it is Rome. I hear the chime of bells. This Romish influence appears to come to me through the imposing style of all connected with the religion and the government."

FISH DURING THE TRENTON PERIOD.

Geologists know very little about the fishes of the Silurian times. That they existed during the deposition of the upper beds there is no doubt; and that they existed during the deposition of many of the lower beds would be regarded, I think, by most geologists, as probable: but we hunt over miles of limestone, slabs of shales and sandstones, and look in vain for any evidence as to the character of the ver-

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tebrate ocean-tenants of those very ancient times. The case is very different when psychometric vision is brought to bear upon the smallest fragment of rock from the Central or Upper Silurian beds. The following examination was of a portion of *Isotelus gigas*, from the Trenton limestone of Trenton Falls, N.Y.: —

"I see some very small animals swimming about in the water, that look like shrimps. There is a good deal of very fine red sea-weed. There is a crustacean, something like a lobster, crawling along at the bottom of the sea. (Draws Fig. 111.) It has four small legs, and one large one, on each side.

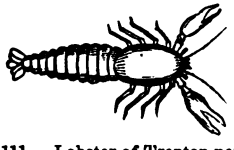

FIG. 111. — Lobster of Trenton period.

"Some small fishes, about three inches long, are swimming near the bottom. They are chubby fish; have no scales, but seem covered with warts. (Draws Fig. 112.) They have small blunt teeth.

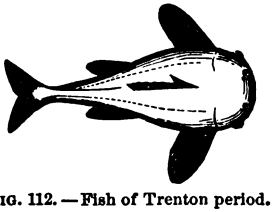

FIG. 112. — Fish of Trenton period.

"I can feel every wave down here; though I think it is twenty feet deep. Every thing feels it: it waves

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the sea-moss back and forth. Another of those crustaceans is here."

EARTHQUAKE ON HAWAII.

As I have already intimated, great caution is necessary in drawing conclusions from what is seen by psychometers, and especially in reference to time. When the first geographical examinations were made, I supposed that what was seen by the psychometer was what would have been actually visible to a spectator standing on the spot at the time; but I found that this was not at all times the case, as the following experience demonstrated.

About three and a half years ago, I was desirous of having Sherman investigate the Guano Islands on the South-American coast, and, placing before him a map, asked him to go and visit an island which I pointed out. He said in a few seconds, —

"I am there. I can go quickly when I please; but I could not see any thing when I was going. The wind is blowing tremendously here. It lifts trees forty feet high, and drives them into the ocean. Some birds are trying to fly against the wind; but, though they fly as hard as they can, they make no headway. They are fish-birds.

"I am on a small island a mile broad. The land is very level: from the ocean it hardly rises a foot in six rods. There are no people here. There are a great many trees on the island. The waves come up so high, that they leave the ground nearly bare behind them."

("Go north.") "I am on a larger island now; I

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should think, twenty miles across. (The wind stopped as soon as I got away about ten miles.) This looks a great deal better; but there are not so many trees."

After describing this island and a neighboring one, we conversed for a little while; and I pointed to Hawaii, the largest of the Sandwich Islands, and asked him to go there. As I knew that he did not know the character of the island, I thought that a discovery of Mauna Loa or Kilauea, two famous volcanoes on this island, would furnish an excellent test.

"I had got nearly back here while I was talking.

"I am up so high now, that I can see from America to Asia. Oh, there is a host of islands! The sea has not lost its color even this far off.

"I have got at it, I am almost sure. It is longer than wide, and very crooked on the edge.

"Oh! there is an earthquake here now, and the trees are shaking. I can see the ground going down near the ocean, or the waves going down: I don't know which. It is not a very bad earthquake, I think; but, as the earth shook, I saw a pebble that lay on a flat rock roll back and forth. Little shocks last about a second, and then longer ones.

"I can see great waves going out from the island like a moving wall on the still ocean all round. The earthquake is just on the island.

"There are so many birds in the air, that one can hardly see the sun, — all kinds of birds, big and little.

"I was lucky to catch it just then. Every time the island gives a jar, a wave goes out, and keeps dwin-

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dling away, as it goes, to nothing. It goes like a rope when you shake it. I do not see that any thing on the island has fallen. The birds are beginning to settle down. I can see where cracks have been made in the mud near the shore five or six feet deep."

("Go down and see what causes the earthquake.")

"Oh! it is very rough down there. Don't the lava dash! There is a great hollow place above the lava, that looks miles high. I can see the light shine on the rocks. When the lava goes down, steam rushes down; and, when the lava comes back, it drives the steam up again. Don't it roar! It seems as if I could put my hands on the lava, and feel it. The lava is close to the rocks everywhere except this place, and the rocks are soft as pudding. It looks horrid down there, — worse than any hell I ever heard of. It seems as if the steam was trying to push the lava down, and the lava to push the steam up; but the lava is the stronger.

"I see another hole, and there is steam in that too. I should like to know how the steam gets down there. I cannot describe it: nothing can describe the way it looks. I have come to a place where the lava is calm; and there is quite a space between the lava and the rocks, and no steam either. I want to get out of it: it makes me jump. I realize it more than I used to.

"I am out now. I am glad to see the ocean. The sea is all calm now."

I came to the conclusion that he had struck the island during an eruption, probably, of Kilauea, but thought it best to obtain some independent testimony of this before giving it publicity.

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Mrs. Denton, the same evening, went to the island, after looking at the map, knowing nothing of Sherman's examination. After a few minutes she said, —

"I seem to be a little way from it. It seems as if there was some electrical disturbance that kept me off it. I do not believe that I can get on it; and I do not think that I should like to remain long, if I could. It does not seem safe. I get no more than a general influence."

Mrs. Denton subsequently examined the island, and saw an eruption of Kilauea; but the notes of that examination I have mislaid. Feeling sure that an eruption was in progress in Hawaii, I told a few friends, and looked with great anxiety for news from the Sandwich Islands. But weeks and months passed without any earthquake-news from Hawaii; and I came to the conclusion, at last, that they had obtained a psychometric view of the island in one of its disturbed conditions, when it seemed so real to them, that they were unable to distinguish it from the present.

COAL-MINE NEAR PITTSBURG.

W. W. Robbins of Milford, N.H., having read "The Soul of Things," resolved to try a psychometric experiment with a sensitive lady of his acquaintance, Mrs. L. A. Bartlett. He sent her, by letter, a small piece of micaceous sandstone which he picked up on a hill opposite Pittsburg, from which there is a fine view of the city and river. In reply he received a letter from her containing the following statement: —

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"I see quite a wide stream of water and a very large flat rock. The edge seems to project over. The soil looks black, as though there was coal mixed with it. What seems to be the back of the rock is very steep, but very rough; and at the bottom the dirt looks like coal-dust. I see trees unlike any I ever saw, with long stems, and little leaves coming out on each side. Some of the trees are quite tall (1). It seems to me that some time the rock had been buried in the earth, and thrown out by an eruption (2).

"A sadness seems to come over me, as though some one working near got buried, or some accident had happened that caused great confusion. I see a lot of men with spades, or something of the kind, as though they were going to work.

"The air seems more invigorating than it does here. It seems as though I could almost taste it. The stream is not very near the rock. It looks dark and muddy.

"I see a hole that seems to have been dug out, — a sort of cave. It does not go into the rock straight, but slants down a little."

In her letter to him she says, "I enjoy *reading* very much. It is next to travelling. It seems so real to me! I can almost fancy myself at the very place at the time."

(1.) Mr. Robbins was of the opinion that these were locust-trees, which he says grow there, and which the psychometer had never seen.

(2.) What she saw was accurate to the letter, I have no doubt; but her conclusion from what she

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saw, in this case, was faulty. What she supposed was thrown out by an eruption had been taken out by the labor of man.

Mr. Robbins informs me that the hill from which the specimen was obtained is near the junction of the Monongahela and Ohio Rivers. The Monongahela is a muddy stream such as she describes. There is a coal-mine six or seven rods distant from the spot where the specimen was picked up; and, on inquiry, he learned, that, six or seven years previous, three or four men were buried in the mine by the falling of the roof.

LEAD-MINE, GALENA.

The most common explanation of psychometric phenomena that is offered is mind-reading. Many persons have said to me, "I can tell you how it is done. You have an idea of what the specimen has been associated with; and the person who examines just runs off on the line of your thought." Those who have read the first volume of "The Soul of Things" will know the futility of this pretended explanation. The following experiment, which is only one out of many similar that I have tried, will show that it does not explain what Sherman sees.

On March 11, 1867, fragments of the following specimens, placed in small boxes, were shaken together; and Sherman with closed eyes picked out one, and placed it on his forehead, no one knowing what specimen it was till the examination was nearly over, when I looked at it; but he did not know till he was done.

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Nodule, drift-clay, Ottawa. Plaster, Cicero's house, Pompeii. Limestone, Mammoth Cave. Meteorite. Head of sperm-whale. Oil-bearing coral. Lignite, Brandon. Handle of deer's horn, Swiss lake. Mummy-cloth. Elephant's tusk. Fossil-wood, Colorado. Seaweed. Hornstone, Mt. Olives. Silver ore, Washoe. Gold ore, Australia. Fish-tooth, mountain-limestone. Manganese, New Brunswick. Zeuglodon. Tin ore, Arizona. Coal-shale, coal-measures, Rhode Island. Shale, Albert mine. Common charcoal, and sulphuret of iron, Marsden lead-mine, Galena. In all, twenty-three specimens. The specimen examined was the last on the list.

Instantly he said, "I am in a large mine; and there is something like copper on the side (1). The men are digging with pickaxes. They have lights on their heads. I hear the pickaxes pick, pick. I see a cart, into which they put large lumps. It goes out slanting from the mine. There is a shaft, and an opening up to the surface (2). I can look up. It is a good way. I can see a black streak in a rock, and there is shiny stuff in it. A cart-load just went out.

"Just then there was a great blast. The mine is full of smoke. It shattered off a good deal of that that looks like copper. The men all ran and hid behind rock while it went off. They have gone up to it now. Another went off in another part of the mine. It shakes the ground underneath when it goes off. The men have their pickaxes, and are going at it again. They made a hole in slantwise, instead of straight down. It blew off a long piece of rock; and they are breaking it up. A piece fell off just

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then, and knocked a man's hat off, and his light out. It buried the hat. A good way off, the lights look like stars in a dark night. I can look outside, and it is all sunshine. The stuff they get out is kind of blue and bluish-yellow (3). I cannot see it clearly down there. I can see some green specks in it. It seems pretty rich." (I looked at the specimen.)

"I looked in from the outside. It is very dark, — as dark as pitch. I saw a fuze burning; and then off it went. It lighted up the mine so, I could see the ore. A man just came down in a bucket. He has a light on his head. The buckets are not lifted up by hand: an engine pulls them up with a wheel. It turns, and that winds up the rope" (4).

(1.) There is in the mine a great deal of sulphuret of iron, which incrusts most of the galena.

(2.) There is a shaft, and also a slanting passage, down into the mine; or was when I was there.

(3.) The galena is, of course, blue; and the sulphuret of iron is a golden-yellow.

(4.) There was an engine drawing up ore in the way he describes.

The fragments examined were small, and entirely unknown to him; so that I know mere feeling of the fingers could have conveyed very little idea of their character to him: yet the examination exactly fits one of them, and one only, and that one the specimen that was examined.

On another occasion he tried a specimen from the same mine when I knew its character; but he was still ignorant of it.

"I see the mine. There is a place as big as this

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room. I see buckets going up and down. There is something black in them; but I don't know what it is. I know now: it is lead. The miners have lights in their caps. They shine like stars. I see a crack. There is a good deal of this lead in it. It is all covered with yellow stuff. Farther up, there is a lot of little cracks, with some in.

"Now I am on top. They take it from here with wagons to where they melt it."

A CALIFORNIA GOLD-MINE.

JULY 5, 1870.

A specimen of sulphuret of copper, taken from a California gold-mine, was examined by Sherman. He saw the specimen, but was told nothing about it.

"I see a farmer ploughing. He picks up a piece of rock, and is looking at it. He puts it in his pocket, and goes on ploughing. He shows it to his wife at dinner. He is half crazy over it. He says his fortune is made.

"I see him bring some men with drills. They have a tip-cart, and make a road right through the corn. They have got out a cartload. The farmer has a magnifying-glass, and is looking it all over carefully, and slapping his hands on his knees now and then.

"They are blasting now. The vein goes down slanting, and they go down on it. The farmer says, no wonder his corn did not grow well on that place. It is a great deal richer farther down; but then it gives out. Another kind of rock comes in and cuts it all off. The mine is in the richest part now, and very near the place where it is cut off."

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A VEIN OF MANGANESE.

About eight years ago, I visited a very interesting locality in New Brunswick where a vein of manganese was exposed in the face of a cliff, on the shore of the Bay of Fundy. I broke off a small piece of manganese from the exposed mass, and, on my return, submitted a small portion of it to psychometric test. The specimen was unseen by Mrs. Denton, and its character entirely unknown.

"I see a vein that looks like iron: if not, there is a good deal of iron about it. The vein is long, and pretty deep. It must be six or seven feet wide in places. In some places the ore is cut off by rock; but the vein continues beyond still thicker. I do not know but it is manganese on the other side. Yes; and it is rich. There is not much iron in it there. There is a large body of it; and it extends as far as I can see.

"It is curious: I can only go one way. It seems as if it existed the other way; but I cannot go to it. It seems like a mist on the other side. I feel it there, and sense it; but I look, and it is gone. How singular! It has been on the other side some time; but it is gone now, and has just left its influence.

"I see now what has done it. It has been washed away. I seem now to feel the influence of the sea. The sensation produced by the absent material is very peculiar. It is faint and shadowy.

"In one place, a rock comes up into the vein; and, were they to sink there, they would obtain nothing. This rock divides the vein; and there is a large body

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on both sides. It is, perhaps, seventy-five yards from the sea. Where it comes up, it divides; and there is a little manganese between."

The sea has evidently washed away a portion of this vein, as she describes. Whether the remaining portion of the vein is as she describes remains to be proved, as I am not aware that it has yet been worked.

When the difficulty of measuring the depth at which mineral deposits lie has been overcome, I have no doubt that psychometry will be rendered available to develop those deposits of wealth that lie beneath our feet waiting for our appropriation. Psychometers should be carefully trained for this special work.

THE PARAHLAMOOSH RANGE, COLORADO.

West of the western range of the Rocky Mountains, and just beyond the Tumbianaro valley, is a very remarkable range of mountains, which I found to be over thirteen thousand feet high, and composed of alternate beds of lava and sandstone. Towards the Tumbianaro it presents, in places, precipitous cliffs of immense height, that show the action of eroding agencies, at some past time, on the grandest scale. From the summit of one of the highest peaks in the range I brought a portion of vesicular lava, which was examined by Mrs. Denton seven years ago, she knowing nothing of the nature of the specimen.

"I see a valley cut out by water, and high hills above it. There seem to be very high and naked cliffs here; and they are peculiar, — different from all

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I ever saw. Cliff seems hardly a proper name: they are more open in places than cliffs generally are. They have been cut away by water a good deal. They are more solid as I go back in time. What a region that was! It is so barren from one end to the other, that I cannot see a thing in the shape of vegetation. It was a remarkable upheaval that produced that range. It shakes from one end to the other. It has been twice the height it is now. It is tremendous. Think of miles of solid rock parted, and then coming together with a crash! It does not seem necessary to go back to hear it. I can hear it, here and now, shaking for hundreds of miles, rocking, crashing, and trembling for a long time. There is a long and comparatively narrow portion that is particularly agitated. It probably caused upheavals in other places.

"I can see as many as a hundred cones sending out smoke and fire. What a condition of things! They are all in action at the same time, like so many chimneys over a great fire. The motion has ceased, to a great extent, since these openings were formed. It is an enormous distance from the under-surface of the overlying rock to the fire below. The fire, the melted matter below, appears to be kept in place by enormous pressure of gas and steam between it and the rock above. When the gases had so accumulated that they could no longer be confined, the upheaval of this mighty mass was the result. These cones, or chimneys, have, in a great measure, been formed since then by material deposited by the escaping gases and steam through rents or openings

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left in the rocks after the disturbing forces had, in a measure, subsided. Again and again, however, have the accumulating masses around those openings been torn away by the fury of the forces below; and new cones have again and again been formed by long-continued and more peaceful action."

THE EARTH'S INTERIOR.

With a specimen of gold ore from Briggs Mine, Colorado, Sherman gave the following. He knew that the specimen was ore of some kind.

"I see something that looks like gold in a white rock. There is a great deal more of yellow ore as it goes down. The pieces grow larger, till it is nearly all ore.

"The vein starts at the top, and cuts right through the rocks. It is quite broad.

"I can see lava now. The vein goes down a long, long way, and keeps getting richer as it goes down. It goes down almost to the lava; but it is awful hot, and nobody could stay there. Some of it is melted. All around the rocks are cracked, and there are great hollow places. All I can see is the red-hot rocks.

"There are different kinds of substances floating in the lava, — all kinds of metal mixed up. One kind looks blue. There are places where it has tried to come up, but could not, — big holes. The lava blinds my eyes."

("How far is it down?") "It's more than one mile.

"The lava boils up, and seems to try awfully to get out."

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("What color is the rock above the lava?") "Above the red, the rocks are a very dark green. There are holes miles up. I see a great deal of bright yellow stuff. I think it is gold: it is very pure.

"The vein is of enormous width deep down: it seems to be a mile wide.

"I see other veins all round here, going straight down."

The mine is in the heart of one of the richest gold districts of Colorado, and is surrounded with gold-bearing veins.

A JOURNEY THROUGH THE PLANET.

Working in the garden in June, 1868, Sherman said he could see readily. As I had no specimens with me, I took him into the cellar of our new house, which was near, and said, "Go straight down here, and tell me what there is under."

"There is a fine bed of sand, and then gravel under here: there are lines of dark-colored sand among the light. Under that it is all trap, then slate (1) and thin yellow rocks, and then granite that is awful thick. It keeps getting warmer and warmer as I go down, then hot and red-hot, and then lava." ("Go down through the lava, and see what there is on the other side.")

(Pause.) "Oh, but it is a long way! I am not through yet. I cannot see any thing in the lava. Going through this is like having the nightmare. I have got to granite on the other side (the granite goes all round). Above that is a kind of black rock, very thick, but not very hard: it is a kind of slate. Then

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yellow rock, and a big bed of sandstone: above that is a little trap; and right above that native copper in chunks and lumps: there is a great deal of it. I come to hollow places that glisten: I don't know what is in them (2). There is trap above that, and copper again (3), and then mud-rock, that splits very easy, with fossils in it. Above that is a very hard rock like flint, and then a rock full of holes, and then dirt to the top.

"Oh, what a pretty country! There are houses with bells all round; and, when the wind blows, they ring. Some are like tents, and scalloped all round, and have pictures of animals on them, — lions, eagles, elephants, and things. I see fishermen all along the shore of the ocean" (4).

(1.) Sand and gravel occur immediately under the soil, and reach down to a considerable depth: trap deposits and slate beds occur in the immediate vicinity.

(2.) These may have been geodiferous cavities, and the crystals in them the objects that glistened.

(3.) His statement of the occurrence of native copper with trap is interesting. He could not have been acquainted with the fact that native copper is invariably found in that connection.

(4.) Had he passed through the planet in a direct line, he would not have found the shore of the ocean; but it was hardly to be expected that he could. The country that he saw may have been China or Japan.

Did he, then, really pass in spirit through our globe? I believe that he did; as I also believe that my sister, Anne Denton Cridge, went down to the fluid interior

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of the planet some fourteen years ago, as described in the first volume of "The Soul of Things."

A CALIFORNIAN DIAMOND.

The high esteem in which precious stones have been held in all known ages has not, perhaps, resulted entirely from their beauty. I find that psychometers love the influence that proceeds from crystals generally, and more especially that of those generally designated precious stones. The following examination was from a Californian diamond, known to be such by the psychometer, Mrs. Denton: —

"I love the influence of this. I am where this came from. I see a yellow diamond as large as a robin's egg: it is very clear. I see a number of brilliant white ones. They are in a kind of crevice. The yellow one is in the rock. I do not think it is far from the sea. It fairly electrifies me. I like the influence better than gold. The yellow one has a delicate tinge: it is the largest I see. They are not very deep in the rock." ("How are they formed?") "I do not believe they belong there.

"What I see cannot be right. I see as many as a bushel of all sorts and sizes; but some of them, I think, must be worthless. They are dark, — some with black spots and specks, and some all black; some few as large as the yellow one, and clear; but some dark ones are very large. They do not lie in a heap; but they are connected: they are in one crevice, and near together. The yellow one I first saw seems absolutely pure."

The theory that attributes diamonds to the crystal-

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lization of liquid carbon — the gas made liquid by pressure — seems to be the most probable. Their natural condition is probably that of crystals in cavities of metamorphic rocks. Their hardness having preserved them from destruction during the erosion of ages, we find them generally in beds of gravel, and conglomerate rocks formed of gravel.

DEPARTURE OF THE SPIRIT FROM THE BODY.

What light does psychometry shed on that still dark page of "Nature's infinite book of mystery," — conscious, individual existence after death, and the condition of man in that next state of being? Our researches have been confined almost exclusively to the material side of life; and yet, on several occasions, spiritual existences, apart from ordinary psychometric forms, have spontaneously made their appearance.

About seven years ago I took Sherman into a dark closet, and held a magnet up, and requested him to tell me what he saw. Instead of seeing light streaming from the poles of the magnet, as I supposed he would do, he said he saw a man; and, on describing him, I found the description to agree exactly with that of my father, whom he had never seen. He at the same time said that he could hear him speak; and repeated to me, as from him, what appeared to be very characteristic expressions. At the same time he accurately described my mother, whom he had likewise never seen.

A DYING EGYPTIAN.

Some days afterward, when examining the *shabti* from Thebes referred to in Vol. II., he said, —

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"I see two men: one has no shoes on; and the other has something tied to the bottom of his feet. They don't wear much clothing. They are homely-looking, and have very short and stiff beards. I see two old women that have more clothing than the men: they look sober, and they are a sober people.

"I see one man ready to die: he lies on a flat place, and faintly groans. Nobody appears to notice him. A man is running up to him. He is dead. The man commences to mourn over him, and kind of pray.

"I see the man's spirit standing still over him. It looks better than the dying man. It stands up, and looks a great deal better than the man. It mumbles something that I cannot understand; seems to talk with me. It points upward with a finger. He was walking, and fell over and died. The spirit is a little higher now, — about as tall as I am above him. It keeps rising and rising, but slowly. Now it darts away quickly, and I cannot see it. It went like a flash (1).

"He has come back now, and three with him. He is showing them his body. He talks more distinctly than he did. He points to his body. They are dressed much better than when alive. He seems glad he is dead. They have white thin clothes on. They are all talking away. I see numbers now not far from there: they seem talking to him. One slowly vanished: I saw his feet last. He went like snow before a hot fire, or lead in a furnace. The man that died is looking all round for him, and the others are laughing at him. They seem to have a jolly time. Why, they can go anywhere!

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"I can see a mischievous spirit: he could make a hand, a large one. They seem to be looking at me and touching me (2).

"The one that vanished has returned.

"I can see through the spirits. I can touch and feel that mischievous one. I cannot see through him. He is almost like a man in the body (3).

"Men are digging a hole for that dead man's body: it is easy to dig. There is no wind: all is still. They dig the hole about five feet deep.

"These spirits did not look like those I saw the other night" (my father and mother): "they look like stones compared with polished diamonds."

(1.) Several independent clairvoyants have described the separation of the spirit from the body in a very similar manner.

(2.) I cannot account for such statements as these. I give them, because to leave them out would be to deal unfairly with the reader, and unjustly with the facts.

(3.) Some spirits appear to him, as they have to many spiritual seers, very much coarser than others: and he says that physical manifestations can be made by such spirits much more readily than by the more refined; which is, I think, very probable.

Some years afterward, I asked him to find a dying man, and watch carefully the process of the separation of the spirit from the body.

"I can see some one dying. There is something eating his heart away. I see a hole on one side. People are round him, and a minister is praying. He feels well. He does not stir at all. His heart beats very slowly.

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"I see his heart commencing to be green. It beats more slowly still. They question him; but he does not answer. He is getting cold. His heart stops a while, and then begins again, but fainter every time. Now it only beats once, and stops a long while. It does not beat at all now; but he is not dead. I can see the blood circulating, and his lungs going a little, and his pulse beating; but his heart has completely stopped.

"He was injured: a rib broke, and a piece stuck in his heart. His eyes are almost half open."

("Can you see his spirit?") "I do now. Why, he is not dead yet! his spirit has not left his body. I see a great many spirits; and he is looking up to them. He is rubbing his eyes, just as if he was getting up in the morning, and laughing at the minister, and trying to call his attention, moving his hand before his face; but the minister does not see him.

"The doctor says, 'He is dead.' When the spirit left, it struggled a little: why was that? They don't go off anywhere. Many of them are round the house. Don't he feel nice now! He is dancing around quite lively. He is talking about his mother that he has left: he is afraid she will suffer. They tell him he is tied to his mother's apron-strings.

"He is trying to shake hands with a man he knows; but the man never notices him. He asks him if he has got the floor done. He hardly seems to know that he has left the body. He meets a number, and tries the same; and he is feeling of himself, and looking at his hands, and seems to be surprised.

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"He is clean: he left all the dirt behind. He has no nails nor hair; nor has any of them. Their heads look curious (1).

"I can see them turn over. This one says he dare not, and they laugh at him. I see them go to a library. They are looking at the books. One of them takes up a Bible, and puts it down again, and says, 'I don't want that book;' and the rest say the same. The book don't move; but he seems to hold it in his hand. Every thing must have a spirit."

(1.) This I do not understand.

THE GREAT PSYCHOMETRIC REALM SEEN.

The question is often asked, Where are all these things that the psychometer sees? The following, unexpectedly seen by Mrs. Denton, may shed some light upon this question. Can this be the realm into which the spirit is ushered at death? or is there a still more interior realm, from which we receive echoes occasionally, but of which we still know so little?

"I am in a different realm from any I have ever before observed. I have to become positive, not only to outward surroundings, but even to the psychometric influences usually received, in order to distinguish this. Yet it appears like a realm of real, substantial existences, stretching back, and backward still, almost interminably, into both time and space.

"I see forms, — people, and the results of their labors; even the very efforts that produced the results. At first I thought it a species of mirage. It seemed like a picture of all that had ever been; yet now it

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seems to me that I could step from this planet upon that world (I can call it nothing else), and travel back through all the scenes that have ever transpired in this.

"What a difference between that which we recognize as matter here and that which seems like matter there! In the one, the elements are so coarse and so angular, I wonder that we can endure it all, much more that we can desire to continue our present relations to it: in the other, all the elements are so refined, they are so free from those great, rough angularities which characterize the elements here, that I can but regard *that* as by so much more than this the real existence.

"Something appears to me to be continually passing from our earth, and from all existences on its surface, only to take on there the selfsame form as that from which it emanated here; as if every moment as it passed had borne with it in eternal fixedness, not the *record merely* of our thoughts and deeds, but the actual, imperishable being, quick with pulsing life, thinking the thought, and performing the deed; instead of passing away into utter nothingness, that which is *here and now* forever continuing, an eternized *there and then.*

"That portion of this realm which represents our earth and her history appears to occupy that portion of space through which the earth has heretofore passed, — her entire pathway since she became an independent member of the solar system. The form, however, as it looks to me now, is not that of a sphere, but that of a broad belt, or zone, endlessly

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waved, and gently curved in its general outline as it stretches back into the eternities, where it eventually appears divided; as if two streams which had for ages held a separate course had met at last, and 'mingled into one.'

"This realm appears to me to be illuminated by the same light as that by which all things are psychometrically seen."

There appears to be a spiritual universe as well as a material one, — a universe that contains all that is, as well as all that ever has been. There are the mountains that were levelled before the Alps and the Andes left the ocean-bed. All the rivers that ever ran are there, — the pellucid rills dancing down from the woody hills, and the muddy streams that poured their turbid waters into lake and ocean. There are the coral-polyps that built their stony trees at the ocean-bottom, and the sea-lilies, whose stalks "bent like corn on the upland lea," where our proudest cities are to-day. All the flowers that ever bloomed, all the birds that ever sang, every leaf that waved, and every tiny insect that crawled upon it, are there, none too insignificant for preservation.

There are the Indian tribes that have roamed over the face of this continent for ages, hunting buffalo on the plains, spearing fish in the waters, and shooting with their stone-pointed arrows the deer in the woods. The Aztecs with their bloody religious orgies, the milder Toltecs that preceded them, and formed settlements from Mexico to Lake Superior, where they mined for copper more than a thousand

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years before a Spaniard set foot upon the land, — all are there, — every tool they fabricated, every movement they executed, every word that fell from their lips.

There are Egypt and her millions, that toiled for ages to chisel out her labyrinthine tombs and rear her lofty pyramids; all the hordes that Asia sent in wave after wave from her central grassy plains to woody Europe, where they dispossessed the dark-skinned occupants, and seized their lands by the right of the strongest.

And what thus exists we can come into direct relation with. We can see the mountains, and watch the rivers run; dive to the bottom of the old Silurian oceans, and mark their ancient tenants; roam with the old Indians, sail in their canoes, and lie in their wigwams; hear the thud of the stone hammer on the copper gad in ancient mines of Superior; and know the absolute facts regarding a past that seemed lost to us forever.

By psychometry there is scarcely any thing but we can learn, and by a process so much easier and more delightful than our present cumbrous methods. A personal relic of Shakspeare may in half an hour reveal more of him than his biographers have been able to dig up by dint of the severest application for two hundred years. A pebble from the streets of Jerusalem is a library containing the records of the whole Jewish nation. I have known a little dust from a copper knife reveal to a boy the story of the ancient copper-miners of Lake Superior to the very life, as far as their story is known, and, I

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have no doubt, — from its harmony with itself, with the times, and with the statements of independent psychometers, — true to the very letter where it was otherwise unknown. The most secret deeds of even the most ancient times lie in the light of the brightest sunshine; and we have only to open our spiritual eyes to discover them.

History is to be vastly enlarged, and made much more reliable. The histories of many nations of which we have never heard or dreamed are to be written, and the histories of all others to be rewritten, that fact may take the place of the fables that have been for so long palmed upon mankind. With a fragment from Egypt no larger than a pea, we can learn more of the Pharaonic times than if all the hieroglyphics that were ever made were in our possession, and Champollion and Lepsius had bequeathed to us their Egyptian lore. A piece of a Babylonish brick can call up the ancient dwellers by the Euphrates, and make real as the life of to-day that of Assyria four thousand years ago.

Psychometry must greatly enlarge the boundaries of every science. Scientific men will at first look upon it with great distrust, if not with absolute disgust. All royal roads to learning have, say they, only proved by-paths for idlers to loiter in, without enabling them to gain one step toward any desirable station. Will psychometry prove any better? It certainly will; and a test, by any unprejudiced scientist, of some one of the multitude of sensitives that exist everywhere, would soon satisfy even the most sceptical. I have tested its value in geology during many years. When

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the oil excitement broke out in Pennsylvania, Mrs. Denton psychometrized a specimen of *Favosites Gothlandica* containing petroleum in its cells, and saw at once its animal origin, and that it had no necessary connection with coal or carboniferous beds. This I announced in my lectures and through the papers as early as 1860, at a time when, as far as I could learn, all scientists who had written and were writing upon the subject attributed its origin to vegetable matter, and generally taught its necessary connection with carboniferous beds, — ideas now entirely exploded. Though petroleum is not yet regarded as the product of coral-polyps, who stored it away in those cells so frequently found supplied with it even now, opinions with regard to its origin approach nearer and nearer to the view of the psychometer as the matter becomes better understood. Hundreds of times I have had psychometers describe to me, from various specimens entirely unknown to them, scenes in the earth's past history in harmony with the formations to which the specimens belonged. The same animals and plants have been described over and over again from specimens, also unknown, that had been previously seen by the same persons with specimens from the same period. I have had independent pyschometers describe the same animals and plants with the same specimens, without knowing that they were the same, and, in some cases, animals previously entirely unknown; and I am satisfied that some psychometers can see as clearly the forms of life that existed on this planet twenty million years ago as they can those that are on the globe

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to-day, and with much greater ease. Persons who have not the slightest geological knowledge can see and describe forms known only to the geologist; and children can solve some problems in a few minutes that have occupied the attention of professors for years.

In astronomy, psychometry will do as much as in geology, or more. A first-class telescope cannot be had for less than ten thousand dollars. The labor of a working-man's lifetime would hardly buy one; and, when bought, he could but faintly discern the outlines of land and water on a planet as distant as Mars. Tens of thousands possess telescopes as much better than that as sunshine is brighter than candle-light: all they need is a knowledge of their own powers, and a little instruction in the way to make use of them. With these telescopes they can not only see the outlines of land and water, but they can see water, rocks, plants, homes, and people, and watch those people as they follow their daily avocations. A telescope only enables us to see; but the spiritual faculties enable their possessors to hear, smell, taste, and feel, and become, for the time being, almost inhabitants of the planet they are examining. The secrets of our solar system, that scientists have sought so earnestly to penetrate, are soon to be revealed; and the process by which this is to be accomplished is such a simple one, it seems amazing that we had not previously discovered it.

It must not be imagined that all this can be done without close investigation and careful discrimination. It is quite interesting to watch the progress of a psy-

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chometer when getting at the history of a specimen that is familiar to the listener; to see theory after theory thrown down as more and more light is revealed by the psychometric vision. I have known a psychometer to remain in the dark in reference to some important point after even five or six examinations; and where the objects examined are such that we cannot check the statements of the psychometer, or only by the statements of other psychometers, the greatest caution is necessary. For some examinations it is best that the psychometer should know nothing about the history desired from the specimen; but, in most cases, the more highly cultured the psychometer is, the better and more reliable the results. Had Sherman the knowledge of comparative anatomy possessed by Owen of England, or of botany that Gray of America has, his descriptions would be almost infinitely superior to what they are now, and carry conviction, by their harmony with known facts, to the minds of the most sceptical capable of appreciating them.

The parties experimenting need a good knowledge of the times to which the specimen is related, or they may think a psychometer very wide of the mark when his descriptions are the very truth. Many statements given in this volume I only discovered to be true after careful examinations of authorities; and many things stated, that I regarded at the time as extremely improbable, proved to be in complete harmony with known facts.

Psychometry will enable us to appreciate a class of people who have never yet had justice done to them:

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I refer to the sensitives, the "odd people" of the world, who see what no one else can discern; who dislike persons and places, though their friends may be perfectly satisfied with them, and can give no reason for their dislike. Some of them feel uncomfortable in a railway-carriage unless close to an open window, and are liable to faint in churches or crowded halls. Some cannot sleep well unless their heads are to the north; and copper or brass affects them unpleasantly. Such people are endowed by nature with a more active condition of the spiritual faculties; and they can, as a general thing, readily develop into good psychometers, who will, before long, fill a very prominent place in the intellectual advancement of the race. The lunatic asylum has imprisoned some of the best of these, in consequence of their extreme sensitiveness, who, by judicious treatment, might have been the noblest pioneers of science.

Woman, who is by nature much more sensitive than man, and who derives, often unwittingly, much knowledge by the exercise of her spiritual faculties, is to be greatly benefited by a knowledge of psychometry. Instead of spending her time in writing or reading caricatures of human nature, such as are nineteen-twentieths of our popular novels, she can read and write true histories of men and women, tracing the most noted characters of the past, rapidly or slowly, as she pleases, through every event of their lives, see and read the documents they have written, and hear the very words that fell from their lips. What fiction can equal such true stories as these? From experiments that I have tried, I am satisfied that many of

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them might go back from living individuals, step by step, into the past, along the line of either parent, and give a true description of their ancestors for thousands of years. Indeed, I know of no limit to this power.

The cultivation of the psychometric powers will aid materially, I think, in weakening the influence of the animal passions, and bringing the individual under the control of the moral and spiritual faculties. The passions may be gratified till the individual descends to the level of them, and the brute is master of the man; or the spiritual may be cultivated till it holds the reins, and guides the individual only where it is for his highest interest to travel. The habitual exercise of these highest powers allies us to the pure and good, and helps to bring about that better time for humanity that we all desire so much to see.

Psychometry will shed much light upon the spiritual nature of man. Every successful psychometric experiment is a revelation of its wondrous powers. I sometimes listen with breathless awe to the statements of psychometers as they unravel the profoundest mysteries of Nature; and I see that we possess powers that we have hitherto considered the exclusive property of the gods. If we could but realize what we are, we should scorn to be mean or impure. How could we, the royal children of Nature, live unworthy of our lineage and destiny?

Our destiny is also indicated by it. It cannot be that we should possess such powers as psychometry reveals, and yet these be scarcely used by one in a

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thousand. Death cannot extinguish these god-lit fires, which must burn and illumine for a future commensurate with the past that psychometry reveals. Here is a magnificent palace, on which architects have been employed for an immense period in rearing, improving, and decorating. Here are rooms fit for angels, and appliances innumerable for the comfort and happiness of those who may be fortunate enough to dwell in them. Is this built merely to be thrown down before one thousandth part of it has been occupied or used? These spiritual faculties that we possess are the evidences of the spiritual realm for which they are fitted, and where life is to be perpetuated under more favorable conditions. What the psychometer sees for an hour at a time, and with difficulty, we may be able to observe at leisure, and draw instruction from as a living volume. What a realm! — the heavens of all ages for the astronomer; all the past of our planet, and its myriad life-forms, for the geologist; all the facts of man's existence for the historian; all plants, from the fucoids, that spread their arms on the tepid seas of the primeval world, to the soaring cedars of California, for the botanist; for the artist, all the giant mountains that the rains of æons have washed away, — the bare, black precipices, seamed with white veins, that frowned above the old Devonian seas; and the cañons, eaten by the mad streams that went roaring through them, and then leaped into the ocean with a more than Niagara fall; the smoking mountains, the flaming craters, and the spouting geysers, not

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of this planet alone, but of all worlds in our system, and, it may be, of all worlds in all systems; the ever-growing soul finding unlimited time and an ever-expanding universe to gratify its unceasing desire to be, to do, and to learn.

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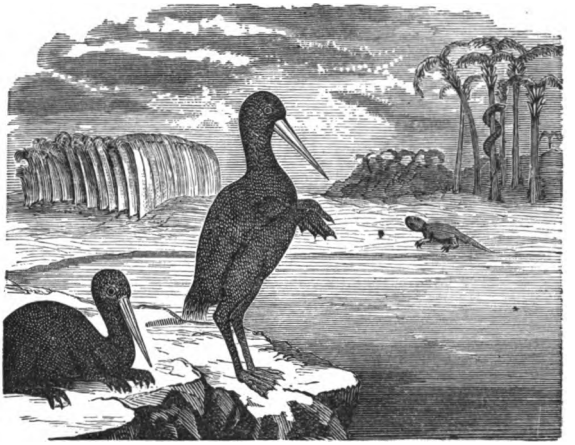

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